THE

NAUTILUS

A QUARTERLY JOURNAL
DEVOTED TO THE INTERESTS
OF CONCHOLOGISTS

VOL. 52
JULY, 1938 to APRIL, 1939

EDITORS AND PUBLISHERS

HENRY A. PILSBRY
Curator of the Department of Mollusks and Marine Invertebrates,
Academy of Natural Sciences

H. BURRINGTON BAKER
Associate Professor of Zoology, University of Pennsylvania
PHILADELPHIA, PA.

THE SCIENCE PRESS PRINTING COMPANY
LANCASTER, PENNSYLVANIA

CONTENTS

Names of new genera and species in *italics*

THE NAUTILUS

Vol. 52 July, 1938 No. 1

NOTES ON THE COWRY, *CYPRAEA SPADICEA*, SWAINSON

BY WILLIAM MARCUS INGRAM

There has been very little published on the nut-brown cowry, *Cypraea spadicea* Swainson. The literature that is available is scattered and is almost entirely of systematic nature. The writer has collected members of this species for a number of years, and at this time is able to add to the literature already published, notes on the bulla stage, development of shell and color pattern, individual variations in size, and distributional range.

During the late summer of 1937 three individuals of *Cypraea spadicea* Swainson still in the bulla stage were collected alive clinging to the under surface of a stone in a tide pool at Laguna Beach, California. At the same time 2 smaller bulla stages were taken on the beach near the place of the first collection. The writer has not been able to find any descriptions of the bulla stage of this cowry in the literature, and believes that his are amongst the first to have been taken in the living state. The bulla stages that were collected are 19.5, 19, 19, 18, and 11 mm. in length, and are very similar to the corresponding stages of *Cypraea carneola* Linnaeus. A complete description of the bulla stage based on the 19 mm. individuals and numbered 4234 and 4235 in the writer's collection follows (Pl. 1, figs. 8–11).

Shell color creamy-brown; shell crossed by three brown bands extending from columella to outer lip, middle band 4 mm. in width, anterior and posterior bands 3 mm. in width; coloring of middle band most distinct; posterior band limited to the body whorl at the base of the spire; spiral whorls arise abruptly from body whorl, apex pointed; aperture 6 mm. broad at point of maximum width; columella creamy-white; external banding visible in cavity of the shell.

The shells that may represent the next stage in development from the bulla were also obtained alive in a tide pool at Laguna Beach, California, and are numbered 5453 and 2369 in the writer's collection. These shells are 42 and 46 mm. in length respectively. In these specimens the columellar teeth are just beginning to form and the outer lip of the younger bulla stage has turned ventrally and medially. There is no indication of the thickening of the basal margins of the shells. The three brown color bands over the dorsal surface of the shell still persist. The only indication of the brown blotch on the dorsal surface that is characteristic of the adult is represented by a band of deep brown color about 7 mm. broad on that part of the body whorl adjoining the spire. The spire is very prominent and in both specimens measures 5 mm. in height. The columellar and outer lips and lateral surfaces of the shells are just beginning to assume the white color that is characteristic of these regions in the adult (Plate 1, fig. 12).

Six other shells numbered in the writer's collection consecutively from 1452 to and including 1457 and also from Laguna Beach probably represent that stage in shell development immediately preceding the adult. These specimens measure from 39 to 52 mm. in length. The teeth on the outer and columellar lips are perfectly formed, and the two lips as well as the basal-lateral margins of the shells have thickened so that they are characteristically adult. The 3 brown color-bands over the dorsal surface of the shell still persist. The brown blotch of the typical adult is still confined to the body whorl adjoining the spire, and in the largest specimen is 10 mm. in width. The spire is still visible in one specimen, but cannot be seen in the others. One typical example of this stage is shown in Plate 1, figure 13.

It seems apparent that the last adult shell character to be formed by this mollusk is the brown-blotched color pattern of the dorsal surface. Other species of cowries that form the dorsal color pattern as the last of the adult shell characters are: *Cypraea ventriculus* Lamarck, *Cypraea cervus* Linnaeus, *Cypraea cervinetta* Kiener, and *Cypraea cribraria* Linnaeus. In the majority of the members of the family, however, the last adult shell character to be assumed is the thickening of the base and the lateral walls of the shell. A few of the many species that illustrate this point in

the development of color pattern and shell are: *Cypraea sulcidentata* Gray, *Cypraea reticulata* Martyn, *Cypraea intermedia* Gray, *Cypraea vitellus* Linnaeus, and *Cypraea arabica* Linnaeus.

There is a great variation in size shown by nature members of *Cypraea spadicea* Swainson. The shell size here is based on shell length, the measurements being made from the extremity of the anterior to the extremity of the posterior shell regions over the base. In computing the measurements listed here only fully mature shells were used. Of the 160 specimens the writer examined, the largest measured 61 mm. and the smallest 31 mm. in length. The shells from San Pedro, California, proved to have the largest average length. The 34 shells from this locality that were measured possessed an average length of 50.5 mm. The specimens collected at San Diego, California, had the smallest average shell length. These shells showed an average length of 35.5 mm. for the 24 individuals measured. The 40 shells from Laguna Beach, California, that were measured had an average length of 42.2 mm.

As well as the writer has been able to determine the reported range of *Cypraea spadicea* Swainson extends from Monterey Bay, California, the northernmost locality, to San Martin Island, Mexico. Mrs. C. H. Fackenthall, of Pacific Grove, California, collected the specimen on which the northern record is based.[1] Her specimen was taken alive on Chinatown Point, Monterey Bay, California. Mr. A. M. Strong reported this species as occurring at San Martin Island, Mexico.[2] The writer is of the opinion that the specimen collected by Mrs. Fackenthall was a stray, and that the general northern range limit of this species is Santa Barbara, California, since no other authentic live collections have been made north of this locality. Individuals are seemingly to be found in greater abundance at San Diego, Laguna Beach, and San Pedro, California, than at any other locality in the species' distributional range.

In the fossil state this species has been reported from the Pliocene, Pleistocene, and recent formations. Grant and Gale list it from the middle Pliocene of Holser Canyon in Los Angeles

[1] S. S. Berry, *Miscellaneous Notes on California Mollusks,* The Nautilus, Vol. XXII, pp. 37–41, 1908.

[2] A. M. Strong, *Marine Mollusca of San Martin Island, Mexico,* Proc. of Calif. Acad. of Sciences, 4th series, Vol. XXIII, No. 12, pp. 191–194, 1937.

County, California; from the Pleistocene of Santa Barbara Island, and upper San Pedro Series of Deadman Island at San Pedro, Los Angeles County, and from the recent Santa Barbara Island to Cedros Island, Lower California.[3] Arnold lists *Cypraea spadicea* Swainson as occurring in the Pleistocene of Santa Barbara Island and from San Pedro[4]; and Gabb reports the species from the Post-Pleistocene of Santa Barbara Island.[5]

Cypraea spadicea Swainson

Cypraea spadicea Swainson, Phil. Mag., Vol. LXI, p. 376, 1823.
Cypraea spadicea Gray, Monograph, *Cypraeidae,* Zool. Jour., Vol. I, p. 71, 1824.

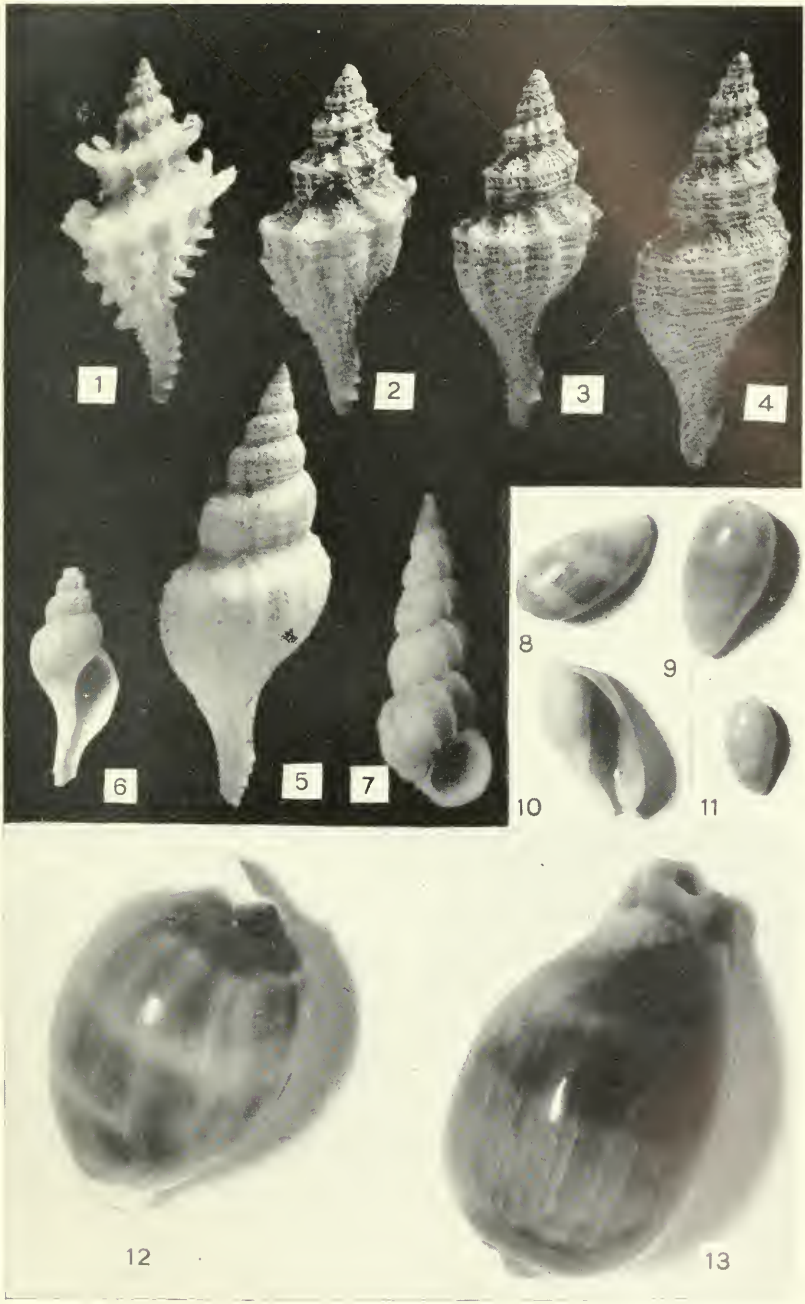
Shell obovately oblong, somewhat pyriform, attenuated anteriorly; aperture varies in width at anterior extremity from 3 to 4 mm., and at posterior extremity from 3 to 5 mm.; teeth vary in width from .50 to 1 mm., teeth rounded on free edge and distinct, teeth spaced from each other on columellar and outer lips from .25 to 1 mm. apart, teeth on columellar lip restricted to aperture, teeth on outer lip extend approximately 1 mm. over the base; anterior and posterior canal extremities rounded, posterior outer lip canal extremity projects further from bulk of shell than the posterior columellar lip extremity, projections of anterior canal extremities may be equal, or if not, the anterior columellar lip extremity projects the further; shell color over the dorsal surface chestnut-brown, clouded toward the edges with burnt brown, edged with a confused row of dark brown spots, which in some shells are not distinguishable having blended together in growth to form a waved dark brown line; sides of shell vary in color from smoky-grey to pinkish white, base of shell ivory-white; spire covered by last layer of enamel to be laid down on dorsal surface of shell, spire outline may or may not be seen under this enamel layer.

The above description is based on the results obtained from an examination of 72 shells, and represents a fairly complete account of the peculiarities that are characteristic of this species. The shells that were examined varied in length from 31 to 61 mm.

[3] U. S. Grant and H. R. Gale, *Pliocene and Pleistocene Mollusca of California and Adjacent Regions,* Memoirs of San Diego Society of Natural Sciences, Vol. 1, 1931.

[4] R. Arnold, *The Paleontology and Stratigraphy of the Marine Pliocene and Pleistocene of San Pedro, California,* Contributions from the Hopkins Seaside Laboratory of Leland Stanford Jr. University, XXXI, 1903.

[5] W. M. Gabb, *Cretaceous and Tertiary Fossils,* Geological Survey of California, Paleontology, Vol. II, 1869.



Figs. 1–5, Trophon lasius (Dall) × 2. 6, type, nat. size. Fig. 7, Epitonium tollini Dall, length 8 mm. Figs. 8–11, Cypraea spadicea Sw., bulla stage; 12, following stage; 13, stage immediately preceding adult; all slightly enlarged.

CYPRAEIDAE FROM GUAM

WILLIAM MARCUS INGRAM

Guam is the largest and the southernmost of the Marianas Islands. It is situated in 13° 26′ North Latitude and 144° 39′ East Longitude. The island is composed almost entirely of raised coral formation, and is approximately 30 miles long, with an average width of about 7 miles.

The data used here are based upon specimens collected by H. G. Hornbostel in 1923 and 1925 and by Lieutenant Commander and Mrs. Clark in 1937. The cowries taken by Mr. Hornbostel are now housed in the Bernice P. Bishop Museum in Honolulu, and those gathered by Lieutenant and Mrs. Clark are in the writer's collection.

The two collections include 18 species of cowries from Guam, the majority of which were taken from Tumon Bay on the west shore of the island. A shelving reef in this bay provides an ideal habitat for marine mollusks. Here the surf is but moderately rough, and much of the reef is exposed at low tide.

Apparently the most common species in Guam are *Cypraea moneta* Linnaeus, the common Indo-Pacific species, and *Cypraea lynx* Linnaeus, which is also Indo-Pacific in its distribution. None of the other species listed here are abundant in the two collections.

At least two of the eighteen species were used by the early inhabitants for ornamental or for burial purposes. Perforated individuals of *Cypraea tigris* Linnaeus in the Bishop Museum collection indicate that members of this species were employed for personal adornment. Hornbostel reports that beach-worn shells of *Cypraea caput-serpentis* Linnaeus were found in almost all monument sites where the native dead were buried.[1]

My purpose here is to record the members of the *Cypraeidae* from Guam, and to present further information regarding the distribution of this family in the North Pacific.[2,3]

[1] Thompson, L. M. *Archeology of the Marianas Islands.* Bishop Museum Bull. 100, 1932.

[2] Ingram, W. M. *The Family Cypraeidae in the Hawaiian Islands.* THE NAUTILUS, Vol. 50, 1937.

[3] Ingram, W. M. *Cypraeidae from Christmas, Palmyra, Washington,* and *Fanning Island.* THE NAUTILUS, Vol. 51, 1937.

Cypraea annulus Linnaeus. The annular ring on the dorsal surface of all shells is very distinct. The 11 specimens in the writer's collection are of nearly uniform length; the largest shell measuring 20 mm. and the smallest 16 mm.

Cypraea arabica Linnaeus. The arabic pattern is clearly defined; the marginal filling is light brown. The largest specimen measures 60 mm. in length.

Cypraea caput-serpentis Linnaeus. The marginal filling in all specimens is dark brown and extends well over the lateral surface of the shell. The dorsal reticulated color pattern is clear; dorsally the anterior and posterior canal regions are marked by a blotch of white or brownish-white.

Cypraea carneola Linnaeus. The largest of the specimens is 50 mm. long. The individuals are all elongate; none approach the so-called variety *propinqua* Garr.

Cypraea erosa Linnaeus. Specimens have a very light dorsal coloration, and the eroded pattern on the outer lip is pronounced.

Cypraea helvola Linnaeus. The specimens have a moderately orange colored marginal filling. Dorsally the anterior and posterior canal extremities are marked with purple. The largest individual is 25 mm. long.

Cypraea intermedia Gray. The reticulated pattern on the dorsal surface of many of the shells is composed of nearly circular breaks in the otherwise light brown pattern. The largest individual is 44 mm. long.

Cypraea isabella Linnaeus. The brown dashes on the dorsal surface of the shell are very light.

Cypraea lynx Linnaeus. The dorsal coloration of the majority of shells is light brown. The writer has two specimens which are a smoky blue-grey in color. The largest individual is 55 mm. long.

Cypraea mappa Linnaeus. There is but one individual in the museum collection; this is the pink base form. Its length is 85 mm.

Cypraea mauritiana Linnaeus. The reticulated pattern is clear, and the dorsal anterior and posterior canal regions are tinged with orange-brown.

Cypraea moneta Linnaeus. This is the most common species in the collections. The individuals vary in color from deep orange

to greyish-white. A few possess an imperfectly formed ring on their dorsal surface.

Cypraea reticulata Martyn. The individuals are small; the largest specimen is 56 mm. long.

Cypraea talpa Linnaeus. The largest individual in the collections is 66 mm. long.

Cypraea testudinaria Linnaeus. One specimen is in the museum collection. Its dorsal surface is light brown blotched with darker shades of this color.

Cypraea tigris Linnaeus. Two adult and one juvenile specimen are in the museum collection. The adults are 80 mm. long. One has a blotched brown dorsal color pattern, and the other a brown spotted pattern.

Cypraea ventriculus Lamarck. The largest individual of those in the collections is 55 mm. in length.

Cypraea vitellus Linnaeus. The marginal fillings of all of the specimens are dark brown. The largest shell is 60 mm. in length.

THE TYPE LOCALITY OF "*HELIX TUDICULATA* VAR. *TULARENSIS* HEMPHILL"

BY G. D. HANNA

On June 16, 1933, I had an opportunity to escape the summer heat of the San Joaquin Valley where some field work was in progress. The high land of the Sierra Nevada in the drainage of the various branches of Tule River was the most convenient place for a brief visit. As I approached Porterville Hemphill's "*tularensis*" came to mind with its vague locality, "Fraser's Mill" about which there has been much speculation. The nature and location of the "Mill" has not been recorded in conchological literature and some of us fear it might fall in the long list of "lost localities." Mr. J. B. Hardaway in Porterville told me I should seek an old settler in Springville, Mr. J. R. Talley. Mr. Talley gave me very complete information which was later verified by direct examination and through the help of Mr. George Dillon, of Mountain Home. This is essentially as follows:

The mill was built by J. B. Fraser about 1878 to convert a fine grove of giant sequoias into lumber. In 1886 it was sold to the

firm of Newport and Pease who ceased operating in 1888, and shortly thereafter the mill was destroyed by fire.

The mill site is about an eighth of a mile east of the packing station called Mountain Home, Tulare County, California. It is on a small flat of the north fork of Tule River, three miles west of Balch Park, a grove of giant trees owned by Tulare County and maintained as a free public park. The elevation of the mill site is 6,280 feet. Many parts of heavy machinery remain about the place and a young sequoia, five feet in diameter at the base, has grown completely around the old crank shaft of the mill engine.

Living snails were found to be fairly common in the near vicinity under logs, boards and pieces of bark, at or near the water's edge. At Camp Nelson on the middle fork of Tule River, elevation about 4,500 feet, they were even more abundant in similar habitat. Dense shade seemed to be preferred but was not essential. No good rock slides were found in the vicinity of either Mountain Home or Camp Nelson but everything indicated that *tularensis* does not require such shelter. The country rock in both places is massive granite and this, presumably, causes a scarcity of calcite which in turn is reflected in the excessive thinness of the shells. Some specimens have almost the thinness and texture of oiled tissue paper.

The relationship of the species is believed to be with *Helminthoglypta cypreophila* Newcomb, an inhabitant of the Sierra farther to the northward, but it is a thinner and usually much smaller shell. The coloration of the mantle is very similar in both.

It is not known when Hemphill made the original collection or how he happened to be in this section of the mountains. He separated the specimens he retained in his own collection into six lots and labelled four of them "Types." These are his numbers: 8772, 3 shells, "small elevated"; 8773, 3 shells, "medium elevated"; 8774, 4 shells, "depressed"; 8775, 3 shells, "large elevated." One of the remaining lots, 8776, is a single bandless shell and is indicated as, "Type lot." The other lot 8777 contains two shells, likewise labelled, "Type lot" and from "Cramer, Tulare County, Calif." It is significant that these last bear the notation "Very large, passing into *cypreophila* Newc." All of these 16 specimens have been segregated into the special collection

of type material at the California Academy of Sciences. The diameter varies from 19 to 26.5 mm., average 22.06 mm.; the altitude varies from 12.2 to 18.3 mm., average 14.11 mm.

References to the species in the literature are as follows:

Epiphragmophora tudiculata tularensis Hemphill, Pilsbry, Naut. Vol. 27, Sept. 1913, p. 49. "Perforate, very thin, yellowish citrine or light yellowish olive."

Epiphragmophora traskii tularica Bartsch, Pilsbry, Naut. Vol. 31, 1918, p. 108. [Mentioned in review of Bartsch's paper.]

Epiphragmophora traski tularensis Hemphill, Pilsbry, Naut. Vol. 11, Sept., 1897, p. 59. [Nomen nudum.]

Epiphragmophora tudiculata tularensis Hemphill, Pilsbry, Naut. Vol. 11, Sept., 1897, p. 60. [Nomen nudum.]

Epiphragmophora traskii tularensis Hemphill, Pilsbry, Man. Conch. Vol. 9, 1894, p. 199. [Nomen nudum. No loc.]

Epiphragmophora tudiculata tularensis Hemphill, Lowe, Naut. Vol. 30, 1916, pp. 93, 94. [Vernal Falls, Yosemite.]

Epiphragmophora traskii tularica Bartsch, Proc. U. S. Nat. Mus. Vol. 51, Des. 21, 1916, p. 615, pl. 116, figs. 1–3.

Epiphragmophora traskii proles Hemphill, Pilsbry, Man. Conch. Vol. 9, 1894, p. 199. [Nomen nudum. No loc.]

Epiphragmophora traskii proles Hemphill, Pilsbry, Naut. Vol. 11, Aug. 1897, p. 48. [Nomen nudum. Fraser's Mill.]

Epiphragmophora traskii proles Bartsch, Proc. U. S. Nat. Mus. Vol. 51, 1916, p. 616, pl. 116, figs. 4–6. Type P.A.N.S.P. No. 62270. Fraser's Mill. Review, Pilsbry, Naut. Vol. 31, 1918, p. 108.

Adult shells which I collected at Mountain Home vary in diameter from 18.8 mm. to 27.3 mm. and in altitude from 13.4 mm. to 17.2 mm. Those from Camp Nelson vary in diameter from 21.5 mm. to 27.8 mm., and in altitude from 13.9 mm. to 17.8 mm.

The species *proles* is believed to be entirely different from *tularensis*. The collection of the California Academy of Sciences contains eight specimens labelled "Types" by Hemphill and from "near Fraser's Mill, Tulare Co., California." All are greatly depressed and widely umbilicate. His catalog number is 8681. No characters were given for the form in the first two published references to the name; therefore, it should date from Bartsch, 1916. The specimen he figured as "Type" is higher than any of those selected by Hemphill and it has a much darker colored spiral band. I did not find the shell at all during my recent visit to the region of the type locality.

REMARKS ON SOME WEST AMERICAN MOLLUSKS

BY G. WILLETT

In Cornell University Bulletin of American Paleontology (vol. 8, no. 36, 1921), Katherine E. H. Van Winkle figures Carpenter's type specimens of *Opalia insculpta* and *Trophon tenuisculptus,* both from the Santa Barbara 'Pleistocene' (probably upper Pliocene). After studying these figures, together with Carpenter's original descriptions, Dr. U. S. Grant, A. M. Strong and the writer are agreed that Dall's *Epitonium crenimarginatum* is identical with Carpenter's earlier *E. insculptum* and the latter name should be used for our Recent California species.

We also believe that the description and figure of the type of *'Trophon' tenuisculptus* prove this species to be a *Tritonalia,* not a *Trophon.* The principal characters substantiating this belief are the short canal, and the thickened and denticulated lip of the fossil. We have examined similar specimens from the Santa Barbara Pliocene, Carpenter's type locality, but have not seen the species from the Recent fauna. *T. tenuisculpta* appears quite close to *Tritonalia squamulifera* (Carpenter in Gabb, Paleontology of Calif., vol. 2, sec. 1, pt. 2, 1869, p. 44) ; in fact, Gabb comments on the similarity of the two, but separates them on differences in sculpture. This feature, however, varies considerably, especially if worn specimens are included with material considered. An appreciable difference between the two lies in the number of axial ribs, which are about twelve in *tenuisculpta* and only seven or eight in *squamulifera.* Fossil specimens of the latter in the writer's collection are much more shouldered than *tenuisculpta* and are usually spined at the angle. *Squamulifera* is the shell figured by Arnold (Mem. Calif. Acad. Sci., 3, 1903, pl. 5, fig. 1) as *Ocinebra barbarensis* Gabb. It was omitted by Grant and Gale (Mem. S. Diego Soc. Nat. Hist., 1, 1931), although it is a common Californian fossil. A larger series might show that *squamulifera* grades into *foveolata* (Hds.).

The common shell that is found in most west coast collections labelled *Trophon tenuisculptus* is a true *Trophon* of the subgenus *Trophonopsis.* As this species is clearly different from *tenuisculpta* of Carpenter, it becomes necessary to find another name

for it. Fortunately, one is available, *T. lasius* Dall. A photograph of the type of the latter (pl. 1, fig. 6), furnished through the kindness of Dr. Alexander Wetmore, of the United States National Museum, appears to represent an unusually smooth specimen of the shell we have been calling *tenuisculptus*. Considering the remarkable amount of variation in this species (see pl. 1, figs. 1–5), which runs from almost smooth examples to ornately frilled ones, it is strange that more names have not been applied to it.

Tritonalia barbarensis (Gabb), a Recent shell described from Catalina Island, is figured by Dall (U. S. Nat. Mus. Bull., 112, 1921, pl. 6, fig. 5), and Oldroyd (Stanford Univ. Publ. Geol., 2, pt. 2, 1927, pl. 30, fig. 5). This species is also common in the upper Pliocene at Fifth and Hope streets, Los Angeles, at Santa Barbara, and in the lower Timms Point horizon at San Pedro. The Pliocene specimens are not quite the same as the Recent, differing in greater average number of axial ribs and less prominent spines at the shoulder. These features probably indicate a closer relationship to *T. squamulifera* in the Pliocene than exists today. *T. barbarensis* is a smaller, thinner, more slender shell than *squamulifera,* with relatively smaller aperture. However, there are Pliocene specimens of the two species that are quite similar.

Los Angeles Museum, Los Angeles, California.

NEW VARIETIES OF *ANGUISPIRA* AND *DISCUS*

BY GORDON M. KUTCHKA
CARNEGIE MUSEUM

While making a monographic study of the genera *Anguispira* and *Discus* in the Carnegie Museum as a thesis problem for my Master of Science degree, I discovered five new varieties. I am greatly indebted to Dr. S. T. Brooks for his aid in photographing the shells, also to Dr. H. A. Pilsbry for the privilege of studying the collection of Academy of Natural Sciences. These new varieties are:

ANGUISPIRA ALTERNATA JESSICA var. nov. Pl. 2, fig. 1.

Shell slightly elevated, light reddish-brown, somewhat shiny; surface above covered with rows of reddish squares, below with one row of these dots just beneath periphery; whorls 5½, angulated;

embryonic whorl covered with criss-cross markings; remaining whorls covered with rib-striations, which are prominent above, and weaker below; intermediate striae many, coarse and deep; spiral striae faint; periphery slightly angulated, possessing a slight carina in some specimens; aperture somewhat ovate, parietal wall with a very thin callus deposit; umbilicus narrow, deep, showing all inner whorls. Greater diam. 20.75, lesser 18.75 mm.; height 11 mm.

Type Locality: Stevenson, Jackson County, Alabama. *Holotype:* G. H. Clapp Collection, Carnegie Museum, No. 7102. *Paratypes:* Academy of Natural Sciences, Philadelphia, No. 169413, and United States National Museum, No. 471561. *Distribution:* Tennessee and Alabama.

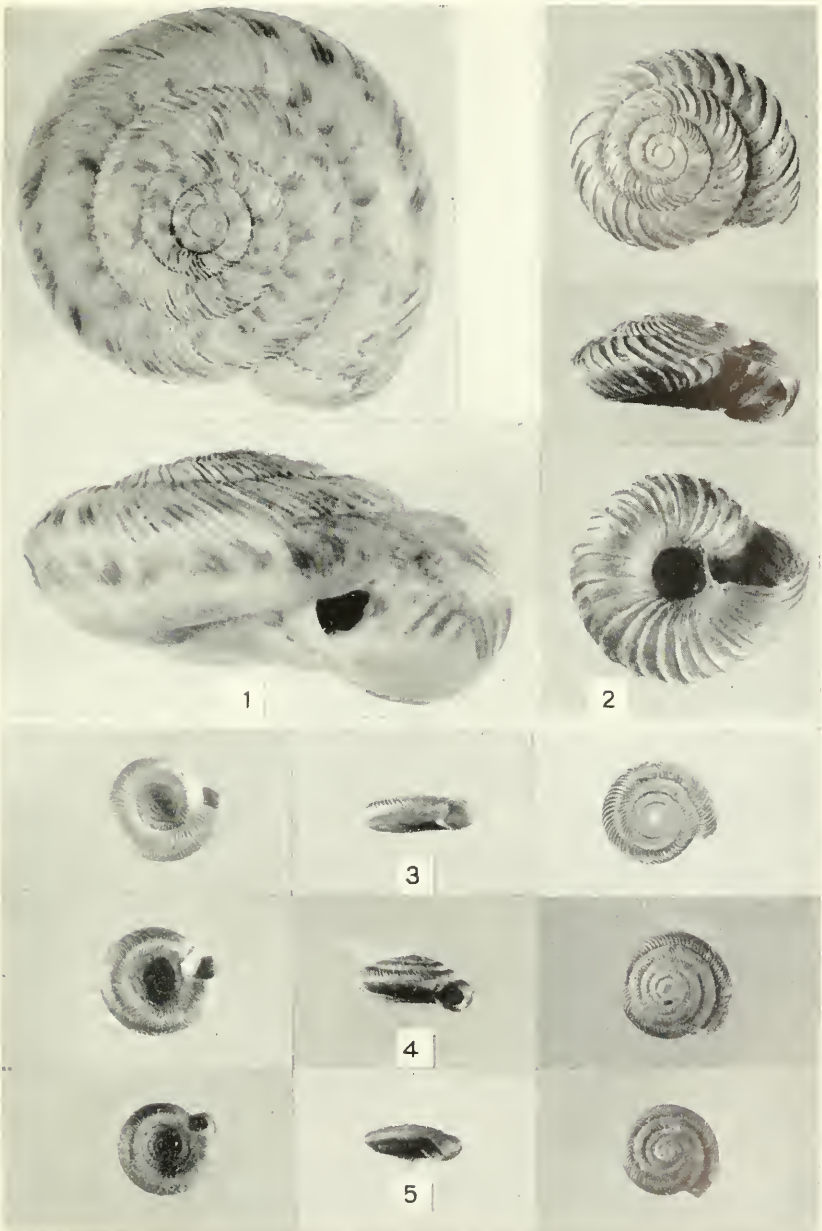
The slight carina places this variety close to some of the specimens of *A. alternata carinata* that are found in Tennessee and Alabama; these varieties also belong close to *jessica* in coloration. *A. alternata jessica* lacks the carina, flat shell, and rhomboidal aperture of *A. cumberlandiana columba* and *A. c. alabama.* This variety has been named in honor of my wife, who has been a constant companion and an ever present inspiration to me.

Anguispira alternata paucicostata var. nov. Pl. 2, fig. 2.

Shell slightly depressed, buckthorn-brown color, dull; spire slightly elevated; whorls 5½, flattened; embryonic whorl slightly criss-crossed; surface covered with only a few brown spots; heavily ribbed, the rib-striations continuing over the angulated periphery to the umbilical region; *rib-striations 1.5 mm. apart,* smooth on top; intermediate striae many, coarse and deep; spiral striae few and very faint, their continuation around whorls broken by rib-striations; aperture wider than high, rendered somewhat rhomboidal by slightly acute carina, parietal wall covered with a slight callus deposit; umbilicus narrow and deep, showing all inner whorls. Greater diam. 16.75, lesser diam. 13.75 mm., height 8.5 mm.

Type Locality: Mt. Mitchell, Buncombe County, North Carolina. *Holotype:* Carnegie Museum, Section of Recent Invertebrates, No. 62.30645.

The dorsal rib-striations are much like those found on *A. alternata costata,* but those of *paucicostata* are much further apart and they continue over the periphery to the umbilical region. The



1. Anguispira alternata jessica, diam. 20.75 mm.
2. Anguispira alternata paucicostata. ×2.
3. Discus patulus brooksi. ×2.
4. Discus patulus angulata. ×2.
5. Discus bryanti tuberculata. ×2.

shell is much duller in coloring than in *costata,* much more like that of *A. alternata smithi,* but somewhat darker.

DISCUS PATULUS BROOKSI var. nov. Pl. 2, fig. 3.

Striations much pronounced and wide apart; shell honey-yellow in color, shiny, comparatively flat; whorls 5½, rounded; aperture oval, slight callus on parietal wall; striations continue around periphery to umbilicus without decreasing in size; umbilicus wide, showing all inner whorls; embryonic whorls smooth, rest heavily striated; intermediate striae very faint; rib-striations white on top, without any striae crossing them transversely; some of striations do not enter umbilical region but anastomose with others which enter this region; internal columellar tubercle small. Greater diam. 7.125, lesser 6.25 mm.; height 2.5 mm.

Type Locality: Pyriton, Clay County, Alabama. *Holotype:* Carnegie Museum, Section of Recent Invertebrates, No. 62.30647. *Paratypes:* Academy of Natural Sciences, Philadelphia, No. 169412, and United States National Museum, No. 471560. *Distribution:* Ala.; Tenn.; S. Car.; N. Car.; and Ga.

Shell usually flatter and much lighter in color than typical *Discus patulus;* also the umbilicus is wider, the striations are farther apart, and the intermediate striae are weaker.

This subspecies ranges in measurement from 7.125 to 8.25 mm. for the greater diameter, and 6.25 to 7.25 mm. for the lesser diameter.

This subspecies has been named in honor of Dr. S. T. Brooks, who has given me much aid and many useful suggestions during the preparation of my thesis problem.

DISCUS PATULUS ANGULATUS var. nov. Pl. 2, fig. 4.

Shell slightly elevated, reddish-brown color, dull; spire elevated; whorls 5½, angulated; embryonic whorl smooth; surface heavily ribbed above, the rib-striations forming a carina as they pass over the periphery; rib-striations smooth on top; intermediate striae faint; rib-striations below continue into umbilicus; umbilicus moderately wide, deep, showing all inner whorls; aperture somewhat rounded; internal columellar tubercle medium in size. Diameter 8 mm.; height 3.5 mm.

Type Locality: Paint Rock, Madison County, North Carolina. *Holotype:* Carnegie Museum, Section of Recent Invertebrates, No.

62.30646. *Distribution:* Western Pennsylvania and Maryland; West Virginia; Kentucky; Great Smoky Mountains of Tennessee and North Carolina; and Appalachian Mountains of South Carolina, Georgia, and Alabama.

This subspecies can readily be distinguished from the typical *D. patulus* by the angulated periphery; the rib-striations in passing over the periphery form a carina, which is more or less prominent.

DISCUS BRYANTI TUBERCULATUS var. nov. Pl. 2, fig. 5.

Shell depressed, reddish-brown color, dull; spire slightly elevated; whorls, 5½; somewhat rounded; embryonic whorl smooth, remaining covered with rib-striations; body whorl bicarinate, somewhat flat or slightly concave between the carinae; flat space somewhat smooth, the rib-striations continue across it as striae; intermediate striae faint; umbilicus moderately wide, deep, showing all inner whorls; aperture somewhat ovate, *internal columellar tubercle present* and *prominent.* Diam. 7 mm.; height 3.25 mm.

Type Locality: Careyville, Campbell County, Tennessee. *Holotype:* Carnegie Museum, Section of Recent Invertebrates, No. 62.30648. *Distribution:* Va.; Ky.; Tenn.; N. Car.; and Ala.

The prominent *internal columellar tubercle* distinguishes this subspecies from *D. bryanti* and its allies. The periphery, which is characteristic of *D. clappi, bryanti,* and *bryanti nigromontanus,* sets it apart from *D. patulus.* It can be regarded as an intermediate form of *patulus* and *bryanti.*

LIST OF MOLLUSCS FROM DRIFT DEBRIS OF PALADORA CREEK, TEXAS

BY W. T. CLARKE, JR.

During the summer of 1937 while attending the Clovis, New Mexico, Expedition of the Academy of Natural Sciences of Philadelphia, I had the opportunity to take several side trips for the purpose of collecting invertebrate fossils and recent molluscs. On one of these trips Malcolm Bull, a member of the expedition and a resident of Canyon, Texas, escorted me to Paladora Creek which lies four miles east and three miles north of Canyon, Texas. Paladora Creek which has cut deep into this barren plain region

of the "Panhandle" of Texas has formed the Paladora Canyon. In this canyon and along the banks of the creek I secured from large piles of drift debris the following species with the exception of the *Sphaerium, Physa* and *Uniomerus,* which were found living in the creek.

Sphaerium sulcatum (Lam.), var.
Pisidium compressum Prime.
Musculium transversum (Say).
Uniomerus tetralasmus camptodon (Say).
Gastrocopta armifera (Say).
Gastrocopta cristata (Pils. and Van.).
Gastrocopta procera (Gld.).
Gastrocopta pellucida hordeacella (Pils).
Vallonia costata (Müll.).
Vallonia perspective Sterki.
Carychium exiguum Say.
Vertigo ovata Say.
Hawaiia minuscula (Binney).
Helicodiscus parallelus (Say).
Gyraulus parvus (Say).
Pupoides marginatus (Say).
Physa gyrina Say.
Succinea avara Say.
Lymnaca obrussa Say.
Helisoma trivolvis (Say).

I wish to thank Dr. Henry A. Pilsbry who helped me with the identification of the above species and Dr. Stanley T. Brooks for identifying the Sphaerium, which is rather unlike the usual Eastern form of *S. sulcatum.*

NEW SPECIES OF *UROCOPTIS* AND *EUGLANDINA*

BY HENRY A. PILSBRY

Urocoptis (Autocoptis) maxwelli, new species. Vol. 51, pl. 7, fig. 11.

The shell is cylindric, short and wide, about equally blunt at the ends. The summit is very shortly conic, several early whorls lost in the adult stage, the breach closed by a convex septum. The whorls are but slightly convex, joined by a linear, not crenulated suture, the last rounded at the base, not keeled. Surface white with a few scattered dusky spots. Sculpture of very fine, rather weak hair-like striae. The aperture is subcircular with slight irregularity; the peristome somewhat expanded, its plane not carried forward quite to the anterior outline of the shell, in contact with the preceding whorl for a short distance and thickened in that part. The internal axis is rather thin and decidedly twisted in the upper half, *becoming rather thick* in the penult and last whorls.

Length 13 mm., diam. (above aperture) 6 mm.; $6\frac{1}{3}$ whorls maining. Type.

Length 13.5 mm., diam. (above aperture) 7 mm.; $5\frac{1}{2}$ whorls remaining. Type.

Near Capuy, Santo Domingo. Type 169741 ANSP., others in the Maxwell Smith collection.

The snail is closely related to *U. olssoni* Pils. from Monte Cristo, but it is less glossy and differs by having the columellar axis decidedly thickened in the later whorls. In *U. olssoni* it is thin throughout. Fewer whorls have been lost at the summit than in *olssoni.* While the base does not have a carina as in typical *Autocoptis,* there are often several low spiral welts on the last whorl.

Euglandina balesi, n. sp.

Puerto Marquez, south of Acapulco, Mexico, among leaves under mango trees. Type 170440 ANSP., collected by Dr. B. R. Bales, 1938; other specimens in the Bales collection.

Shell similar in general appearance to *E. turris* (Pfr.), cinnamon colored glossy, with straight-sided spire not attenuated towards the obtuse apex. The first three whorls are smooth, striae then beginning, at first weak, but becoming rather strong regular and smooth on the later whorls. They do not unite by pairs or pass over the sutural margination, and there is no spiral sculpture. From the fourth whorl on there is a very distinct, nearly smooth, seam-like subsutural margin defined by a groove, and about 0.25 mm. wide on the last whorl. The aperture occupies less than half of the total length. Columella evenly arched, without a callous edge.

Length 35.4 mm., diam. 13.6 mm., aperture 16 mm.; 7 whorls. Type.

Length 35.1 mm., diam. 14.2 mm., aperture 18 mm.; 6½ whorls.

Chiefly characterized by the smooth striation and very distinct sutural margin. The second specimen measured differs from the type by the somewhat larger aperture and by having the columella straight. It will be illustrated in the next number of Nautilus.

BUSYCON CARICA (GMELIN) AS A GENOTYPE

BY BURNETT SMITH

The genus *Busycon,* usually attributed to Bolten, was first proposed by Röding.[1] Six species are given: *Busycon muricatum* or

[1] Röding, Peter Friedrich: Museum Boltenianus sive Catalogus cimeliorum e tribus regnis naturæ quæ olim collegerat. Pars Secunda continens Conchylia sive Testacea univalvia, bivalvia & multivalvia. Pp. VIII, 199. 1798. Reprint. See p. 149.

the *Murex carica* of Gmelin, *B. perversum, B. dubium, B. cingulatum, B. inversum,* and *B. canaliculatum.* The species *dubium, cingulatum,* and *inversum* are not referred to figures and are therefore not identifiable. This restricts a discussion of the nomenclature to the three species *muricatum, perversum,* and *canaliculatum.* The name *muricatum* given above was used by Lister ("Muricata") but as this writer is pre-Linnæan and not binomial Röding's first listed species will in this paper be called *carica*—its proper designation. The starting point for a nomenclatorial investigation then appears to be *Murex carica* of Gmelin, that is, *Busycon carica* (Gmelin).

Busycon carica (Gmelin)

Röding's first species of *Busycon* is listed thus: "*B. Muricatum.* Die stachlige Feige. Gmel. Murex carica sp. 67. Mart. 3. t. 67. f. 744. & t. 69. f. 756." The figures Röding cites are also given by Gmelin. A discussion of these figures will be delayed until the first two figure references of Gmelin[2] have been considered. The first reads "*List. Conch.* t. 880. f. 3. b."[3] On consulting the reprint of Lister's work by L. W. Dillwyn (1823) it is found that pl. 880, fig. 3b shows a shell referable to what is now very generally known as *Fulgur* or *Busycon carica.* Good 20th Century figures for comparison with Lister's may be found in the Maryland Geological Survey's report on the Pliocene and Pleistocene, pls. XLIII–XLV.

Gmelin's second figure reference for the species reads "*Gualt. test.* t. 47, fig. B."[4] Gualtieri's figure makes a very fair check with that shown on pl. XLIII of the Maryland report just mentioned and may be accepted as representing the *Fulgur* or *Busycon carica* of modern usage.

Before taking up the remaining figures given by Gmelin it is believed advisable to call attention to the fact that the species now

[2] Gmelin, Jo. Frid.: Caroli A Linné. Systema Naturae. Tom. I. Pars VI. For pp. 3021–3910 a statement "1791 before May 14" has been pasted in the volume at the Academy of Natural Sciences of Philadelphia. See p. 3545.

[3] Lister, Martini: Historia Sive Synopsis Methodica Conchyliorum, pl. 880, fig. 3b.

[4] Gualtieri, Nicolai: Index Testarum Conchyliorum. Florentiae. 1742. See pl. 47, fig. B.

being considered was erroneously included by Linnæus[5] in his *Murex aruanus*. This description is "M. testa patulo-caudata, spira spinoso-coronata." The references given are "*Rumph. mus. t.* 28. *f. A.*" and "*Gvalt. test. t.* 47. *f. B.*" The description, if so it may be termed, is concluded with "*Habitat ad* Novam Guineam." The figure given by Rumphius[6] shows the well-known *Megalatractus aruanus* (Linn.) reversed in the process of illustration. In a discussion of this last named species Hedley[7] says "Hanley has shown (Ipsa Linnæi Conchylia, 1855, p. 301, and Journ. Linn. Soc. Zool. iv. 1860, p. 78) that the Linnean species *Murex aruanus* referred by nomenclature, description and bibliography to two species. One, an American shell, was separated in 1788 from *aruanus* by Gmelin as *Murex carica*. The other, an Australian shell, was renamed *Fusus proboscidiferus* by Lamarck in 1822." The incongruity of applying the specific name "*aruanus*" to the American shell is noted by Hedley. He further argues "that as the Linnean designation covered two species, the proper course to adopt is to accept the first revision—in this case Gmelin's." The present writer is in complete accord with Hedley's views and favors the retention of the term "*carica*" for the American shell.

The injection of the term "*aruanus*" into the discussion would indeed be of secondary importance were it not that a number of authors[8] have favored its use for the American shell. Two at least have selected *Murex aruanus* as the type species of *Busycon*. Such a type selection for *Busycon* is precluded by the fact that

---

[5] Linnæi, Caroli: Systema Naturæ. Tomus I. Editio Decima, Reformata. 1758. See p. 753.

[6] Rumphius, Georgius Everhardus: D'Amboinsche Rariteitkamer. 1705. See pl. XXVIII, fig. A.

[7] Hedley, Charles: Studies on Australian Mollusca. Part I. Proc. Linn. Soc. N.S.W., 1900, Part 1, April 25th. Pp. 87–100, pls. III, IV. See p. 98.

[8] Herrmannsen, A. N.: Indicis Generum Malacozoorum Primordia. Vol. I. 1846. See pp. 148, 149.

Gray, John E.: A List of the Genera of Recent Mollusca, their Synonyma and Types. Proc. Zool. Soc. London. Part XV. 1847. See p. 135.

Hanley, Sylvanus: Ipsa Linnæi Conchylia. London, 1855. See pp. 301, 302.

Hanley, Sylvanus: On the Linnean Manuscript of the 'Museum Ulricæ.' Journal of the Proceedings of the Linnean Society. Zoology IV. London, 1860. See p. 78.

Murex aruanus was not one of the original species of *Busycon* occurring in Röding's list. Before Röding's list appeared *Murex carica* had already been removed by Gmelin from the *Murex aruanus* of Linnæus. The second figure reference of Linnæus (10th Edition) and the second figure reference of Gmelin are identical.

Returning now to the remaining figures cited by Gmelin it is found that Knorr figured *Busycon eliceans* (Montfort) and that Martini figured not only *B. carica* and *B. eliceans* but *Galeodes morio* (L.) as well.

These figures may now be taken up in detail. Gmelin, in addition to references already considered, give next "*Knorr Vergn.* l. t. 30. f. 4. et 6. t. 27. f. l."[9] The first figure given should read 1 and not 4. This figure is poor but shows what is rather surely not the accepted *Busycon carica.* The subject is too spinose. The date of this figure is 1757. The second figure represents an immature individual of the *Fulgur eliceans* of Montfort.[10] The date of this figure is 1772.

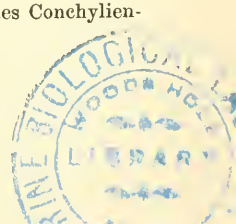
Gmelin's fourth and last citation is "*Martin. Conch.* 3. t. 67. f. 744. et t. 69. f. 756.757."[11] Figure 744 represents *Fulgur eliceans* Montfort while figure 756 shows what is ordinarily called *Fulgur* or *Busycon carica* and is well illustrated as noted before in the Maryland Geological Survey's report on the Pliocene and Pleistocene (Pls. XLIII–XLV). Figure 757 does not represent a *Busycon* or *Fulgur* but shows *Galeodes morio* (Linn.) which antedates the work of Gmelin and is automatically ruled out of his *Murex carica.* Montfort by describing *Fulgur eliceans* in 1810 has thereby left the *Murex carica* of Gmelin a homogeneous species. This homogeneous species is *Busycon carica* (Gmelin), that is, the *Fulgur carica* (Gmelin) so well illustrated in the Maryland report just noted.

---

[9] Knorr, Georg Wolfang: Vergnügen der Augen und des Gemüthes in Vorstellung einer algemeinen Sammlung von Muscheln und andern Geschöpfen welche im Meer gefunden werden. Nürnberg. 4 vols. and 6 parts. 1757–1772.

[10] Montfort, Denys De: Conchyliologie Systématique. Tome Second. Paris, 1810. See pp. 502–504, fig. on p. 502.

[11] Martini, Friedrich Heinrich Wilhelm: Neues Systematisches Conchylien-Cabinet. III Band Nürnberg, 1777.



Homogeneous, well defined, common, and the first species of *Busycon* given by Röding, *Murex carica* Gmelin, that is, *Busycon carica* (Gmelin), would appear on these grounds alone to make an ideal type species for the genus *Busycon*. Furthermore, the name *Busycon carica* appears to have the protection of the "absolute tautonymy" rule.[12] The present writer has so far failed to discover that any author subsequent to Röding has selected or designated one of the original species of *Busycon* as the type of the genus. The name *carica* has a number of times been mentioned as that of the first species of *Busycon*.[13] Such mention, however, does not constitute a selection or designation of the type species of the genus *Busycon*. In the hope of clarifying the situation, fixing a reasonable genotype, and reinforcing the protection of tautonymy this is now being done according to the following statement: *Busycon* Röding [Bolten], Museum Boltenianum, 1798, p. 149: type, *Murex carica* Gmelin.

Fulgur is the most important synonym for *Busycon*. The type species of Fulgur is *Fulgur eliceans* Montfort. Although Montfort cites "*Murex perversus*" in his synonymy the genus is really monotypic. This makes erroneous Cossmann's assertion that "*Murex perversus*, Lin." is the type of *Fulgur*.[14]

In the preparation of these notes the writer has had the benefit of advice from the following specialists—Dr. Katherine V. W. Palmer, Dr. H. Burrington Baker, and Dr. Henry A. Pilsbry.

[12] Schenk, Edward T. and John H. McMasters: Procedure in Taxonomy. Stanford University Press. 1936(?). See p. 34.

[13] Dall, William Healey: Early History of the Generic Name Fusus. Journal of Conchology. April 1906. See p. 296. This is more correctly a ference to *Fulgur eliceans* Montfort, although the word "*carica*" is used by Dall.

Dall, William Healey: A Monograph of the Molluscan Fauna of the Orthaulax pugnax Zone of the Oligocene of Tampa, Florida. U. S. Nat. Mus., Bul. 90, 1915. See p. 66. The word "*carica*" is used but the reference is really to *Fulgur eliceans* Montfort.

Wade, Bruce: An Upper Cretaceous Fulgur. Am. Journ. Sci., 4 ser., XLIII, 1917, p. 294. The word "*carica*" is used but the reference is to *Fulgur eliceans* Montfort.

Wade, Bruce: The Fauna of the Ripley Formation on Coon Creek, Tennessee. U. S. G. S. Prof. Paper 137. 1926. See p. 137. Type of *Protobusycon* but not of *Busycon* designated.

[14] Cossmann, M.: Essais de Paléoconchologie Comparée. Livr. 4. 1901. See p. 76.

A NEW *PSEUDOMELATOMA* FROM CALIFORNIA

BY TOM BURCH

Recently the author dredged a series of shells off Redondo Beach that are apparently living representatives of Grant and Gale's *Pseudomelatoma penicillata* var. *semiinflata.* There are certain differences, however, and in studying the shells with M. Gordon, G. Willett, and U. S. Grant, the following differences between *P. penicillata* and its variety *semiinflata* were observed: The typical form is covered by a thin brown periostracum, while the living specimens of *semiinflata* are covered by a very hard, heavy, black periostracum. Both the inner and outer lips of *semiinflata* have a heavy white callus, while neither lip of *Penicillata* has a callus. The most outstanding differences between the two forms are that *semiinflata* has a secondary notch on the outer lip near the canal, and prominent spiral sculpture on the base of the penultimate whorl, neither of which is found on *P. penicillata.* Also, the periphery and base of the penultimate whorl on *semiinflata* is much more gently rounded. Because of these and other minor differences, the author thinks it advisable to raise the variety *semiinflata* to a species.

Although the series shows a slight variation in the number of ribs, the author presents the following variety:

Pseudomelatoma semiinflata var. redondoensis n. var. Fig. 2.

Shell brown under a black periostracum. Longitudinal sculpture consisting of 14 low, slightly oblique ribs, weaker than on typical *semiinflata* and evanescing below the periphery of the penultimate whorl. Whorls of spire subangular just anterior to the suture. Spiral sculpture more prominent on the base than on spire and consisting of slightly raised lirae.

Dimensions: alt. 45 mm.; length of aperture, 18 mm.; diameter of body whorl, 12 mm.

Holotype: number 381, Allan Hancock Foundation Collection. Dredged in 25 fathoms on gravel bottom off Redondo Beach, California, May 8, 1938, by T. A. Burch, J. Q. Burch, and M. Gordon. Nineteen other specimens were dredged at the same locality during the winter of 1937–38. These paratypes have been distributed to the Academy of Natural Sciences at Philadelphia, No. 170481,

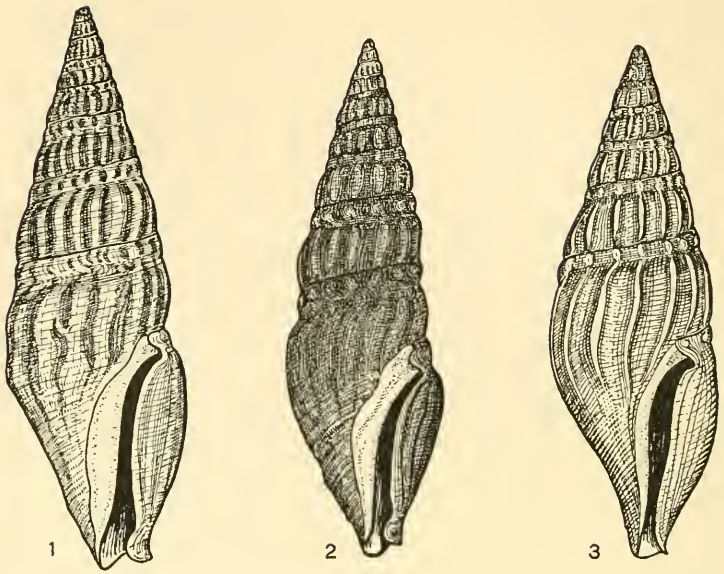


FIG. 1. *Pseudomelatoma semiinflata* Grant and Gale, from Pleistocene of Baldwin Hills, Calif. FIG. 2. *Pseudomelatoma semiinflata redondoensis* n. var., type specimen from 25 fathoms off Redondo Beach, Calif. FIG. 3. *Pseudomelatoma penicillata* (Carp.), from Scammon's Lagoon, L. C.

U. S. National Museum, California Academy of Sciences, and to the collections of G. Willett, U. S. Grant IV, M. Gordon, P. Connolly, and T. & J. Burch. One specimen was dredged by the author off Avalon, California in 25 fathoms, another by the Kerckhoff Labratories off Newport Bay, California, and still another was collected at low tide in Newport Bay by Mr. Whitmore of Redondo Beach.

THE TYPE OF *POLYGYRA* SAY

BY H. A. PILSBRY

Although the selection of a genotype for *Polygyra* was considered briefly by the writer in 1930 (Proc. Acad. Nat. Sci. Phila. 82: 311) and by Dr. Harald A. Rehder in 1936 (NAUTILUS 49: 102), it appears that some further notes are needed for a full understanding of the matter.

Say instituted the genus *Polygyra* in 1818 for three species: *P. auriculata, P. avara* and *P. septemvolva,* which he described in the same paper.

In his Index Molluscorum, etc., 1837, pp. 21, 23, Beck divided *Polygyra* into two subgenera: (1) *Daedalochila,* a new subgenus for *P. auriculata* Say and *P. avara* Say, and (2) *"Polygyra* Say" in a restricted sense for the following:[1]

P. insularum B. [nude name]
P. contortuplicata B. [nude name]
P. planorbula Lm. [= *P. septemvolva* Say]
P. septemvolva Say
P. heligmoidea d'Orb.

Of these species the first two had not been described in 1837, and are thus excluded from consideration. The third, *planorbula* Lamarck, is recognized as a synonym of *P. septemvolva* Say. *P. heligmoidea* is obviously Orbigny's *"Helix" heligmoidea* from Guayaquil, superficially somewhat similar to *P. septemvolva* but now known to belong to the Streptaxidae.

By crediting *Polygyra* to Say and including *septemvolva,* one of Say's species, Beck practically indicated the genotype. *P. septemvolva is the only eligible species in the list,* since Orbigny's species is excluded because it was not in Say's original publication of the genus. *Polygyra* Say, as restricted by Beck, was therefore virtually monotypic! However, there was no more definite type designation.

In November, 1847, J. E. Gray, in a list of molluscan genera their synonyms and types (Proc. Zool. Soc. London, part 15, p. 173), has the following two entries bearing on *Polygyra.*

"Polygyra, *Say,* 1817; *Swains,* 1840. Helicodonta *Férus.* Daedalochila *Beck,* 1837. P. auriculata."

"Polygyra, sp. *Say, Beck.* Helix septemvalva."[2]

Thus Gray designated two types for *Polygyra* on the same page. It might be argued that Gray named a type for *Polygyra* Say and

[1] Beck included also, but with a "?," three other species; but these are excluded from consideration as genotypes by the International Rules, Art. 30, II, e, γ.

[2] *"Helix septemvalva"* is evidently a typographic error for *septemvolva.* Gray's paper abounds in errors; there are two in this short quotation. The date 1817 is wrong for *Polygyra.*

then another for *Polygyra* Beck. But the record shows that Beck was not proposing a new subgenus, but merely restricting Say's genus. I believe that any zoologist would consider Gray's designation of a type for "*Polygyra* sp. Say, Beck," as a perfectly valid type designation for *Polygyra* Say.

Since Gray, as we have seen, named two types for *Polygyra,* the final choice of one genotype rests with the next author dealing with the genus. That was Herrmannsen, Dec. 7, 1847, Indicis Generum Malacozoorum Primordia, 2: 317, who designated *Helix septemvolva* Say the type of *Polygyra* Say.

It should be added that I have had the benefit of advice on the technical points of the case from Dr. Witmer Stone of the International Commission on Nomenclature, and from Dr. H. Burrington Baker.

A PLEISTOCENE SNAIL FROM SAN MIGUEL ISLAND, CALIFORNIA

BY T. D. A. COCKERELL

In May I spent a week on San Miguel Island, and while there was kindly taken by Mr. H. S. Lester to the locality where he found remains of fossil elephants (thought to be of two species) some years ago. The elephant beds, obviously of Pleistocene age, occur on the north side of the island, at the top of the slope or cliff, and the material, evidently once mud, is now extremely solid and hard to work; had it not been so, it would long ago have been eroded away. I found fragments of elephant tusks, and part of a bone of some other animal, while here and there Mr. Lester and I found snail shells embedded. These are much smaller than the living species of the island, but presumably ancestral to it. The fossil may be called

HELMINTHOGLYPTA AYRESIANA LESTERI n. subsp.

Similar to *H. ayresiana* (Newcomb), but max. diam. 14–16 mm., alt. 10–11.5 mm.; the single band, and the sculpture, with distinct spiral lines, as in *H. ayresiana.* One shell, perhaps not strictly contemporaneous with the others, is larger, max. diam. 20 mm., and more flattened than usual. Type Acad. Nat. Sci. Phila. No. 170430.

This fossil may well be considered a subspecies of *H. ayresiana,* but perhaps it may be better to treat it as a distinct species. The original type of *H. ayresiana* had max. diam. 22 mm., alt. 15. Curiously, the *H. ayresiana* shells from superficial (recent or holocene) deposits in the immediate vicinity of the elephant locality are unusually large with max. diam. 24 to 27 mm.

FURTHER NOTES ON THE LOCATION OF COPIES OF SAY'S AMERICAN CONCHOLOGY

BY H. E. WHEELER

A few more copies of Say's *American Conchology* have been reported since the addenda to this study appeared in the last issue of the NAUTILUS.

Dr. William G. Mazyck, of Charleston, South Carolina, reports that he has a copy originally belonging to Mr. Thomas Bland, which contains his autograph. It has all seven parts, including the Synonymy and Appendix, but lacks the Glossary and covers. It is neatly bound and in exceptionally fine condition.

Mr. E. R. Sykes, of Littlemayne, Dorchester (Dorset), England, reports having a bound copy originally purchased in parts, but lacking the Glossary. It contains the Appendix, but it is not stated whether it includes Part VII.

Dr. J. H. Beal, of Cocoa, Florida, writes that he has a bound copy containing all seven parts together with the covers and Glossary. This copy will rank with the few complete copies known.

The Alabama Museum of Natural History, University, Alabama, reports an incomplete copy originally in the library of the late Dr. Eugene Allen Smith which was purchased by him in 1875. It contains only four parts with their covers bound in at the back. The plates are irregularly inserted. It was supposed that Dr. Truman H. Aldrich had a copy of this work, but though his conchological library is also at the Museum, it has not yet been located.

The Carnegie Museum, Pittsburgh, Pa., reports a copy from the library of Dr. George H. Clapp, which contains all seven parts with the covers, but which lacks the Glossary. Inserted in this copy is a letter from Mr. Say in his own handwriting, dated April

10, 1829, addressed to Dr. Griffith, stating that his plates for parts one and two of the *American Conchology* were struck off and waited only the completion of the letter press. It is supposed that another copy of this work with uncolored plates is in the Carnegie Museum library but so far it has not been located.

The author expresses his appreciation to all correspondents who have so kindly responded to his request for information.

FURTHER NOTES ON *ARCHACHATINA*

BY J. BEQUAERT AND W. J. CLENCH
Museum of Comparative Zoölogy, Cambridge, Mass.

1. Our recent revision of *Archachatina* (1936, Rev. Zool. Bot. Afric., XXIX, pp. 73–96) groups the species into three subgenera. In naming these we overlooked, however, that Pilsbry, some years ago (1919, The Nautilus, 32, p. 99, footnote 3), divided the genus into two groups, *Archachatina,* proper, restricted to *A. bicarinata* (Bruguière); and the subgenus *Calachatina* for the remaining species, with *A. marginata* (Swainson) as type. Our subgenus *Megachatina,* having the same type, becomes a synonym of *Calachatina.* That name has been completely ignored thus far. It is not listed in the Index to vol. 32 of The Nautilus, in the Zoological Record, in Thiele's "Handbuch der Weichtierkunde," and in the "Nomenclator Animalium Generum et Subgenerum" now being published in Berlin.

2. Our new subgeneric names were unfortunately spelled in two ways in our paper. We must therefore state that the spelling as it appears first should be retained (p. 76): *Megachatina* (not *Magachatina,* as on p. 78) and *Megachatinopsis* (not *Megachatinops,* as on p. 87).

3. Mr. H. A. Rehder informs us that, strictly speaking, Herrmannsen did not designate the type of *Archachatina,* since he did not use the word "type" in his Supplement of 1852, as he did in the earlier two parts of the "Index." It may be more correct to date the designation of *A. bicarinata* as the genotype from Pilsbry (1904, Man. of Conchology, XVII, p. 104).

4. We have recently received from Mr. G. Schwab a large lot of *Archachatina* collected at Edea, Cameroon. It included five speci-

mens of *A. adelinae* Pilsbry. In comparing these with other specimens in our Museum, we discovered that we had been mistaken in regarding *Achatina modestior* O. Boettger as a synonym of *A. adelinae.* We were misled, first, by Boettger's referring to his *modestior* the snails from Cameroon (Etome and Bonge) which d'Ailly had called *A. knorrii.* Two of these, from Etome, now before us, are unquestionably *adelinae* Pilsbry. In the second place, Pilsbry stated in 1905 that his *adelinae* "seemed to be quite identical" with *modestior;* but he had evidently not compared specimens. A more careful study of two paratypes of *modestior,* as well as of the original description and figures of that species, leaves no doubt that it is a valid species of *Archachatina.* Of true *adelinae* we have now before us specimens from "West Africa," Gaboon and Cameroon (Etome; Bakundu Kaki near the Elephant Lake; Edea). Of *modestior* we have seen, besides two paratypes from Bibundi, two specimens from Moliwe Plantation near Victoria (both localities in Cameroon). The specimens from Yaunde and Kribi, listed in our paper as *adelinae,* are not now available and may have been either species.

5. Our *Archachatina adelinae* var. *candefacta* is a form of *modestior,* not of *adelinae.* It should be called *Archachatina modestior* var. *candefacta.*

NOTE ON UNREPORTED MARINE MOLLUSCS FROM SANIBEL, FLORIDA

Editor of the NAUTILUS:

Dredging operations in the Gulf of Mexico from one half to fifteen miles off shore from Sanibel and Captiva Islands, and in from three to seven fathoms of water, have yielded specimens of species listed below which have not been reported from this locality so far as we are able to find.

Living specimens were taken except where noted.

Arca auriculata Lamarck
Astraea brevispina Lamarck. Dead shell
Caecum carmenense de Folin
Calliostoma sp.
Cancellaria conradina Dall
Cardiomya sp.

Chione intapurpurea Conrad
Codakia orbicularis Linne
Colubraria lanceolata Menke
Corbula carabaea d'Orbigny
Corbula contracta Say
Corbula cubaniana d'Orbigny
Corbula swiftiana C. B. Adams
Crucibulum striatum Say
Cymatosyrinx moseri Dall
Cymatosyrinx thea carminura Dall
Diadora listeri d'Orbigny. Dead shell
Divaricella quadrisulcata d'Orbigny. Fresh valves
Epitonium denticulatum Sowerby. Fresh shell
Gafrarium cerina C. B. Adams
Lamellaria pellucida Verrill
Leucozonia cingulifera Lamarck
Lucapina cancellata Sowerby
Lucapina limatula Reeve
Lydiphnis (*Circulus*) *trilix* Bush
Macoma brevifrons Say
Melanella bilineata Alder
Melanella intermedia Coutraine
Melongena corona altispira Pilsbry and Vanatta
Modulus modulus modulus Linne
Nassarius sp.
Niso interrupta interrupta Sowerby
Pecten raveneli Dall
Pecten ziczac Linne
Pseudochama radians variegata Reeve
Smaragdia viridis Linne
Spondylus echinatus americanus Lamarck
Taras sp., fresh valves
Tellina interrupta Wood
Tellina sp., (*versicolor* Cozzens ?)
Trigoniocardium medium Linne. Fresh valves
Turritella subannulata acropora Dall
Vasum muricatum Born. Fresh shell
Xenophora conchyliophora Born

LOUISE M. PERRY
JEANNE S. SCHWENGEL
TED DRANGA

Sanibel, Florida.
25th April, 1938.

Since this list was in type the following additional species have been determined:

Arca candida Gmelin
Transennella cubaniana d'Orb.
Odostomia trifida Totten
Odostomia bisuturalis Say
Olivella pusilla Marrat
Olivella blanesi Ford
Clathrodrillia pentagonalis Dall
Microtralia, new species.

OPEAS GRACILE HUTTON IN ALABAMA

BY H. E. WHEELER AND ALLAN F. ARCHER

For the first time *Opeas gracile* has been found in an interior locality in the southeastern United States. The locality is the intersection of Sixteenth Street and Tenth Avenue in the heart of a residential section of Birmingham, Alabama. The habitat is a vacant lot used occasionally as a fair grounds by the colored people of the vicinity. *Opeas gracile* lives here in the black friable soil under brick piles, themselves overgrown by Bermuda grass and herbaceous weeds. Associated with it, and living under the same bricks and granite paving blocks, or in the weeds, are the following mollusks: *Hawaiia minuscula* (A. Binn.); *Zonitoides arboreus* (Say); *Polygyra hopetonensis* (Shutt.); *Polygyra inflecta* (Say); *Polygyra thyroidus* (Say); *Gastrocopta armifera* (Say); *Gastrocopta procera* (Gould); *Pupoides marginatus* (Say).

The underlying soil is chert supposedly weathered from a dolomite of Ordovician age. The valley floor lying between Cemetery Ridge, at the southern edge of which this habitat is located, and Red Mountain is of Cambrian age. Red Mountain is the source of the various seams of Silurian hematite which give this district its economic importance. The dolomites of the Valley, known as Jones Valley, is of purer character than the ridge dolomite and does not weather into a chert. From it is obtained the fluxes so essential in the smelting of the iron ores of the contiguous mountain.

Cemetery Ridge is, according to Dr. R. S. Poor of Birmingham-Southern College, a low angle syncline (down-fold), and composed

of a chert weathered from a dolomite generally called Copper Ridge dolomite. Near the habitat of the *Opeas gracile* on its eastern contact it is faulted up. This dolomite is unsuitable as a furnace flux.

This note is intended as an addition to the abstract of a paper read by the junior author at the meeting of the Alabama Academy of Science in April, 1938, and published in the Proceedings, Vol. 10, part 1, p. 4. In this paper *Polygyra hopetonensis* (Shutt.) is for the first time reported from Alabama having been discovered in various cultural areas in the city of Birmingham.

VALVATA PISCINALIS (MÜLLER) IN THE GREAT LAKES

BY JOHN OUGHTON

This snail, a native of Europe, was first discovered in the Great Lakes by Mr. F. C. Baker (and recorded as *V. obtusa* in Trans. Acad. Sci., St. Louis, vol. 8 : p. 94, 1898). It was next noticed by Chief Justice F. R. Latchford in Lake Ontario at Toronto (NAUTILUS, vol. 28 : p. 10, 1914). Since that time, no mention has been made of it.

On first acquaintance, this species might perhaps be called an odd *Valvata sincera* or *Amnicola.* However, it is readily distinguished from our local species when its length (5 mm.), 4 obese whorls, squat spire, narrow deep umbilicus, fine regular radial striae and shining surface are all considered.

The purpose of these notes is to show its present range in the Great Lakes and to include a few notes on abundance, habitat and variation.

The author owes his thanks to the conchologists mentioned below who kindly contributed information. Further, he is obliged to Mr. G. E. Fairbairn, Mr. H. Sprague Troyer and Professor J. R. Dymond for assistance.

Sources of published information follow:

1. Museum of Natural History, University of Illinois, Urbana, Illinois, Mr. F. C. Baker : 1 record.
2. Private collection : Mr. C. L. Blakeslee, Buffalo, N. Y., five records.

3. Private collection: Hon. Chief Justice F. R. Latchford, Toronto, Ontario, 1 record.
4. Royal Ontario Museum of Zoology, Toronto, Ontario, 10 records.

Only the specimens contained in the Latchford and the Royal Ontario Museum of Zoology collections have been seen by the writer.

In the following collections there are no additional records for the Great Lakes:

5. Academy of Natural Sciences, Philadelphia, Penn. This collection was inspected by the writer through the courtesy of the Curator, Dr. H. A. Pilsbry.
6. Buffalo Museum of Science, Buffalo, New York: Mrs. Imogene C. Robertson.
7. National Museum of Canada, Ottawa: Mr. Aurèle La Rocque.
8. University Museums, University of Michigan, Ann Arbor, Mich. Mr. Calvin Goodrich and Dr. H. Vander Schalie.

A small suite of the Toronto shells was submitted to Dr. Elmer Berry, of the University of Michigan, for examination. He declared it to be a characteristic lot of *V. piscinalis*.

In all instances, the records are based upon dead shells. Quite a few are in fresh condition, however, and retain the operculum.

Lake Ontario

1. Charlotte, Rochester, Monroe Co., N. Y. No. 37842 Univ. of Illinois: 5 specimens, Mr. F. C. Baker.
2. Grand View Beach (15 miles west of Genesee River), N. Y. "A few specimens" Sept., 1936, Mr. C. L. Blakeslee.

1. Niagara-on-the-lake, Lincoln Co., Ont. (a) "Not as abundant as at Port Weller," Nov., 1935, Mr. C. L. Blakeslee. (b) Sept. 2, 1936, 10 shells, Royal Ontario Museum of Zoology.
2. Port Weller, Lincoln Co., Ont. "Abundant," June and Nov., 1935, Mr. C. L. Blakeslee. (Note: The Lake Ontario end of the Welland Canal is at Port Weller.)
3. Port Dalhousie, Lincoln Co., Ont. (a) June, 1936, Mr. C. L. Blakeslee. (b) Aug. 22, 1936, 6 shells, Royal Ontario Museum of Zoology.
4. Long Branch, York Co., Ont. April 7, 1936, 6 shells, Royal Ontario Museum of Zoology.

5. Near mouth of Humber River (Sunnyside Beach), Toronto, York Co., Ont. Inside the breakwater. 15–20 shells, Justice F. R. Latchford. A sample of this lot was identified by the late Dr. Bryant Walker. (b) 11 lots, totalling about 1500 shells: Collected between April 25, 1931, and Dec. 19, 1937, Royal Ontario Museum of Zoology.
6. Toronto Island, Toronto, York Co., Ont. (a) Exposed lake shore. May 22, 1937, Royal Ontario Museum of Zoology, 22 shells. (b) Toronto Bay. Oct. 4, 1936 and May 22, 1937. 108 shells, 2 lots, Royal Ontario Museum of Zoology.
7. Oshawa, Ontario Co., Ont. Aug. 26, 1936: 2 shells, Royal Ontario Museum of Zoology.
8. Cobourg, Northumberland Co., Ont. Oct. 11, 1936, 4 shells, Royal Ontario Museum of Zoology.
9. Port Hope, Durham Co., Ont. April 13, 1934, 1 shell, Royal Ontario Museum of Zoology.
10. Bay of Quinte, Belleville, Hastings Co., Ont. June 20, 1936, 1 shell, Royal Ontario Museum of Zoology.

Lake Erie

Presque Isle, Erie, Pa., July, 1936, "One empty specimen found in a brief visit . . .": Mr. C. L. Blakeslee.

No other records are known for Lake Erie, in spite of the fact that it has been fairly well collected, within the last few years, by conchologists on both north and south shores.

There are no records at hand from the remaining parts of the Great Lakes system and the Ottawa River and upper St. Lawrence River, although all these waters, with the exception of Lake Superior, have been moderately well explored conchologically in recent years.

(*To be continued*)

NOTES AND NEWS

Exact Dates of The Nautilus.—Volume 51 (1) : pp. 1–36, pls. 1–3, was mailed July 3, 1937; (2) : 37–72, pls. 4–6, Oct. 22, 1937; (3) : 73–108, pls. 7–8, Jan. 18, 1938; (4) : 109–144 (+ viii), pl. 9, April 21, 1938.—H.B.B.

Dr. Fred Baker died in San Diego on May 16, in his eighty-fourth year. An account of his life and conchological work will appear in the next number.

Dr. F. Haas, formerly malacologist of the Senckenberg Museum, Frankfurt a. M., Germany, has accepted a position on the staff of the Field Museum, beginning his duties on July 1.

Bensonies, new name for Bensonia Pfeiffer.—*Bensonia* Pfeiffer, 1856, Malak. Bl. 2: 119, type *Nanina monticola* Hutton, 1838, Journ. Asia. Soc. Bengal 7 (1): 215, from western Himalayas, is preoccupied by *Bensonia* "Cantor" Gray, 1847, Proc. Zool. Soc. London: 150. *Bensonies,* a genus of Tanychlamydinae (Helicarionidae), is accurately defined by Blanford and Godwin-Austen, 1908, Fauna Brit. India, Testacellidae and Zonitidae: 171.—H. Burrington Baker.

Rumina decollata (Linnaeus) is now thriving on cauliflower and other vegetables in a garden in Pensacola, Escambia County, Florida. A few specimens of this species was sent in to Dr. E. W. Berger, Entomologist of the State Plant Board, Gainesville, Florida, March 24, 1938, who brought them to the writer for identification. Dr. Berger then had their county agent, Mr. R. B. Linger, who sent the samples, to send some more, fifty-two in all. These were left alive for a few days and fed on cabbage, which they seemed to relish, and proceded to laying eggs. This is the first record of the introduction of this species into Florida that the writer is aware of. The shells and eggs are in The Florida State Museum.—T. Van Hyning, Director, The Florida State Museum.

Hydatina physis (L.) in Lake Worth, Florida.—Thirty living specimens were taken in the southern end of Lake Worth in March. About 10 were found burrowed with only a very small portion of shell showing. The rest were moving. More than half had moss on the back such as is found on shells living in Lake Worth, indicating that they had wintered there. They were moving toward the open sea, regardless of whether tide was with or against, and seemed in great haste. Some few pairs were nested (completely burrowed) and mating. None *living* were in evidence since March 25. Mrs. Lyman is doing some investigating today, March 29. She found one adult living specimen of *Chione latilirata* Conr., which is now in the collection of Mrs. Beatrice Procter, Palm Beach.—Frank B. Lyman.

EPITONIUM TOLLINI Dall, new species. Plate 1, figure 7. The above name seems to have been applied by Dr. Dall to a specimen sent to him by Oscar Tollin, but it would appear as if the species had never been defined. In the collection of the U. S. National Museum there is a series of specimens, some from Sanibel Island and some from Marco, Florida. One, U.S.N.M. No. 188931, marked "type" by Dr. Dall in his handwriting, bears the label "Sanibel Island," and Dr. Dall mentions Souther as collector. Another specimen, U.S.N.M. No. 108807, also labeled in Dr. Dall's handwriting, bears the locality "Marco," and O. Tollin as collector. I shall consider Dall's selection of the type final.

The specimen in question is a slender scala, having lost probably a fraction of a turn at the tip and having nine whorls remaining. The first 1.5 of these turns are smooth; the rest are inflated, very strongly rounded and separated by a very deeply constricted suture and marked by 10 slender, decidedly lamellar, very narrow, distantly spaced, axial riblets. These riblets extend prominently to the summit and are attached to the preceding turn. They likewise extend undiminished over the inflated and rounded periphery to the umbilical chink. No spiral sculpture is apparent. Aperture oval; peristome reflected and somewhat thickened, decidedly so on the outer lip. The type measures 8 mm. in length and 3.0 mm. in diameter.—PAUL BARTSCH.

LEIOSTRACA SCHWENGELAE, a New Name.—When I described *Strombiformis hemphilli* in my paper in 1917 in the Proceedings of the U. S. National Museum, vol. 53, pp. 344–345, pl. 47, fig. 4, I did not realize that this was congeneric with *Eulima* (*Leiostraca?*) *hemphillii* Dall, 1883, Proceedings of the U. S. National Museum, vol. 6, p. 330, pl. 10, fig. 4. My *S. hemphilli* will therefore have to be renamed, and I take pleasure in calling it *Leiostraca schwengelae* for Mrs. Frank R. Schwengel who brought the matter to my attention.—PAUL BARTSCH.

THE MOLLUSKS OF LAKE TAHOE.—Lake Tahoe, one of the largest lakes in the western United States, lies near the crest of the Sierra Nevada on the California-Nevada boundary at an elevation of 6225 feet. It catches the drainage from a considerable area close by but has no large inlets. It drains to the north, then east by

Truckee River, which in turn empties into the closed basin of Pyramid Lake, Nevada.

For many years it has been known that there are a few species of fresh-water mollusks in Truckee River,[1] but so far as we have discovered Lake Tahoe is without a record. This seems strange in view of the size of the lake, the purity of its waters and the number of conchcologists who have visited it. Many have made fruitless search of its shores and shallow waters. Several attempts by us indicated that this was not the proper method for collecting if the lake were not barren. This seemed inconceivable because other conditions were such that mollusks could hardly be absent.

Reasoning from analogy with similar large lakes it seemed possible that in this case also these animals would be found in relatively deep water. Therefore a dredge was taken to the lake in October, 1933, and several hauls were made in depths up to 50 fathoms off Chambers Lodge on the west side. In every case beyond 20 fathoms shells were found among the water plants which came up. This procedure was followed on August 13, 1936, with equally good or better results in 30 fathoms off Homewood Resort.

The discovery of shells and the names of the few species found seem worthy of record. These are: *Pisidium* sp., *Parapholyx effusa* (Lea), *Carinifex newberryi* (Lea), *Valvata humeralis californica* Pilsbry, and *Lymnaea* sp.

Undoubtedly additional species will be found when more thorough dredging is undertaken. Tracks and furrows in the white sand off Chambers Lodge resembled those made by *Anodonta* but no specimens or fragments were obtained.

The above, however, were not the first shells actually collected in the lake. During the interval from December, 1926, to March, 1927, James Moffitt collected six lesser scaup ducks there which had fed on mollusks. The stomach contents of these birds were 100 per cent animal matter; a very considerable part of this consisted of fragments and entire shells of *Carinifex newberryi* (Lea). The identification was made by E. R. Kalmbach of the U. S.

[1] Carleton, Henry P. Shells of Truckee River and Vicinity. Proc. Calif. Acad. Sci., Vol. 4, 1869. P. 57.

Biological Survey.—G. D. HANNA and A. G. SMITH, in *California Game and Fish*, 23 : 244, July, 1937.

The Bernice P. Bishop Museum of Honolulu, in continuation of its program on exploration in Oceania, has sent Dr. C. Montague Cooke, Jr., staff malacologist, his assistant Y. Kondo, and Elwood C. Zimmerman, staff entomologist, to Fiji for three months of intensive field work. They will collect insects and land shells, placing special emphasis on the rediscovering of "lost" species and the gathering of data pertinent to Pacific zoogeography. Some of the more important islands of the Lau group, Ovalau and Viti Levu will be visited.

AMERICAN MALACOLOGICAL UNION: EIGHTH ANNUAL MEETING

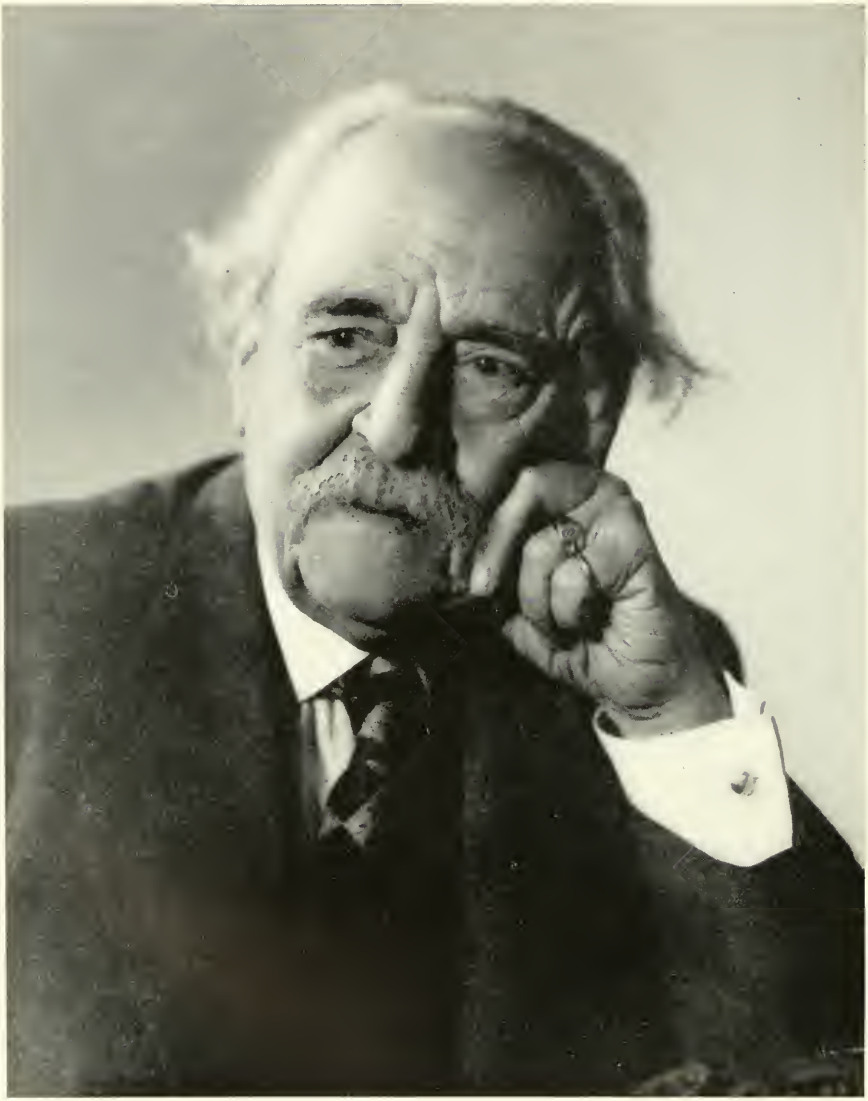
The Eighth Annual Meeting of the American Malacological Union will be held in Havana, Cuba, August 1st to 6th, 1938, as guests of the Cuban Government.

A Cuban boat will transport members from Key West to Havana on August 1st, returning them to Key West at the close of the meeting. Rooms for fifty or more have been reserved at the Royal Palm Hotel in Havana; all without cost to members.

Please send titles of papers and approximate time for delivery *to Dr. Carlos de la Torre,* Museo Poey, Universidad de la Habana, Cuba, *to whom notice of intention to attend* should also be sent *AT ONCE.*

Notice should also be sent at the same time to the Financial Secretary (Mrs. Imogene C. Robertson) so that information as to details regarding accommodations in Key West and place of meeting, not at present available, may be furnished.

IMOGENE C. ROBERTSON,
Financial Secretary, A.M.U., Buffalo Museum of Science, Buffalo, New York



DR. CARLOS DE LA TORRE
President American Malacological Union, 1937–1938.

THE NAUTILUS

Vol. 51 52 October, 1938 No. 2

A NEW CUBAN POLYDONTES

BY CARLOS DE LA TORRE
University of Habana

Among many land mollusks from Oriente Province collected for me by Mr. Natenson, there is a handsome species of *Polydontes* which is here named for him in acknowledgment of his excellent work.

POLYDONTES NATENSONI, new species. Pl. 3, figs. 2, 2*a*, 3.

The imperforate shell is solid, with conoidal spire, strongly angular periphery and convex base; covered with a honey yellow periostracum with some faint darker streaks, and little darker behind the lip, the first two whorls whitish. The upper surface is matt, having a microscopic sculpture as though impressed by a woven fabric; the base slightly polished. The embryonic whorls are rather weakly granulose. On the penult whorl there are short, smooth, irregular radial lines, very little raised, over the woven texture mentioned above (fig. 2*a*). These disappear on the last whorl. The whorls are moderately convex, the last becoming rather strongly convex with loss of the peripheral angle near the aperture, descending shortly in front. The aperture is strongly oblique. Peristome is white, broadly reflected, thickened within, its inner edge having a low, blunt tooth-like prominence near the columellar insertion. The parietal callus is moderately thick, semitransparent.

Height 27.3 mm., diam. 46.1 mm.; 4½ whorls. Type, figs. 2, 2a.
Height 27.8 mm., diam. 48.7 mm.; 4½ whorls. Paratype, fig. 3.

Type locality: west side of the upper Rio Nibujón in western Baracoa. Also in the Sierra de Moa. The type and a paratype are No. 170966 Academy of Natural Sciences of Philadelphia; other paratypes in my collection.

This species is most nearly related to *P. apollo* (Pfr.) of the Yunque de Baracoa, but that species differs by having the periph-

ery strongly keeled; it is truly *carinate,* while *P. natensoni* is *angular.* There is also an important difference in the sculpture. Both have the same microscopic texture, but in *P. apollo* the upper surface is seen under the lens to be finely granulose, while in *P. natensoni* there are curious short radiating markings as shown in the detail figure (fig. 2*a*). This peculiar sculpture, as well as the more strongly angular periphery, separate *P. natensoni* from *P. sobrina.*

POLYDONTES NATENSONI MAURUS, new subsp. Pl. 3, fig. 4.

The shape and sculpture are as described for *P. natensoni* except that the last whorl descends somewhat more deeply in front. Ground color as in *P. natensoni* but duskier, especially on the upper surface, rather closely streaked with bone brown to nearly black, with a black band below the peripheral angle and many dark spiral lines both on the upper surface and the base.

Height 29 mm., diam. 50 mm.; 4½ whorls. Type.

Height 32.1 mm., diam. 47.5 mm.

This form also comes from the Rio Nibujón in western Baracoa. Type No. 170965 A. N. S. Phila.; paratypes in my collection.

THE CUBAN SPECIES OF POLYDONTES

BY HENRY A. PILSBRY

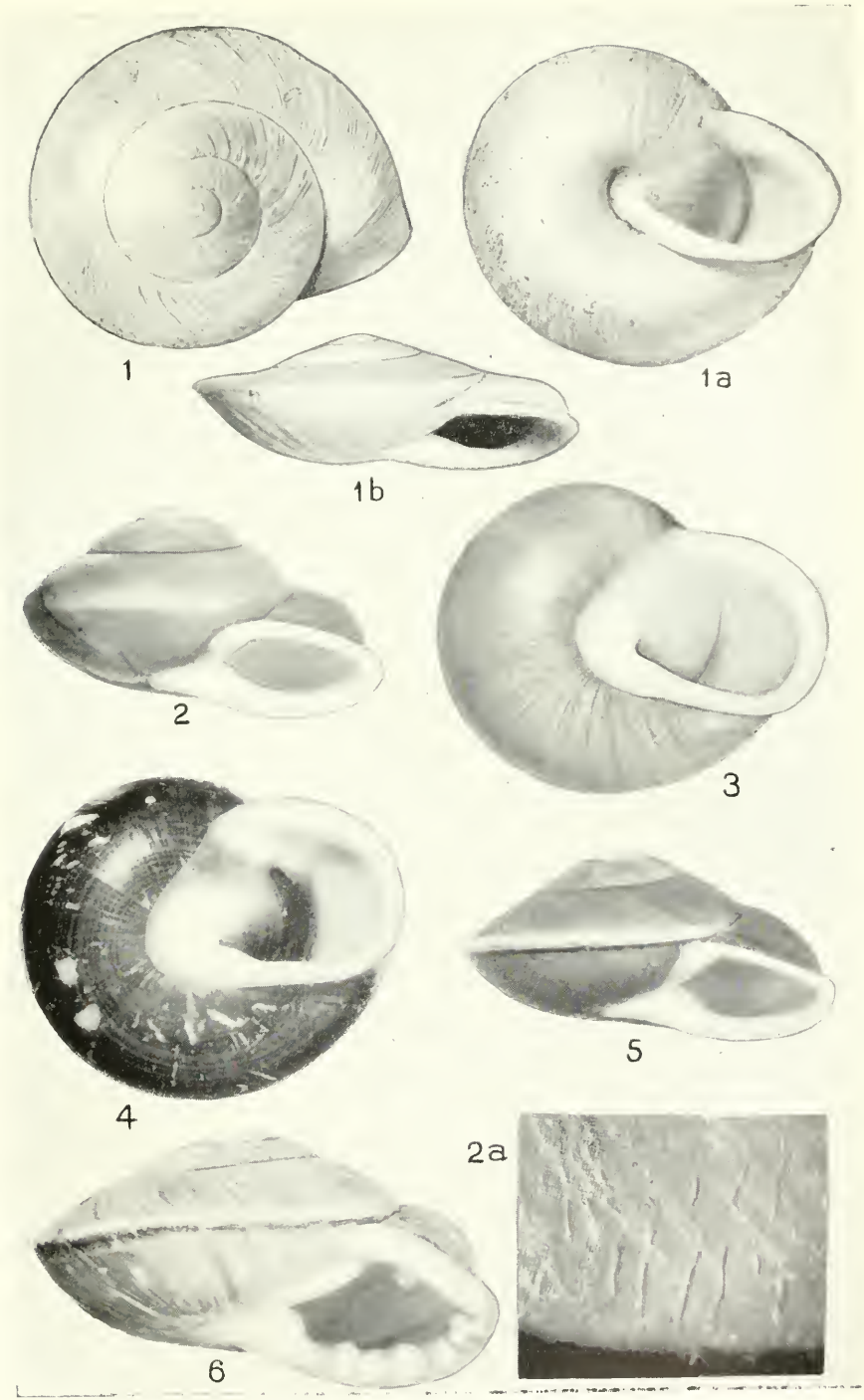
The genus *Pleurodonte,* in the broad sense employed in volume IX of the Manual of Conchology, contained three Cuban subgenera: *Caracolus, Polydontes* and *Zachrysia.* The last of these was subsequently shown to have special anatomic characters entitling it to generic rank. These distinctions have been confirmed by the later work of Jaume[1] and of Moreno[2] on the anatomy of species I had not been able to dissect.

Some years ago I proposed to segregate *Polydontes* as another group of generic value.[3] Whether the genus is to be accepted, in the limits suggested, can be determined only when more of the

[1] Jaume, Miguel L.: Estudio Anatomico del Molusco Zachrysia rangelina, Mem. Soc. Cubana Hist. Nat. 10: 29–31. 1936.

[2] Moreno, Abelardo: Estudio Anatomico de Zachrysia petitiana (d'Orb.). Mem. Soc. Cubana Hist. Nat. 12: 75–86. 1938.

[3] Santo Domingo Land Mollusks, etc., Proc. A. N. S. Phila. 85: 141. 1933.



1–1b, *Polydontes torrei* Pils. 2, 2a, 3, *P. natensoni* Torre. 4, *P. natensoni maurus* Torre. 5, *P. apollo* (Pfr.). 6, *P. imperator* Montf.

species of Haiti and Porto Rico are available for dissection. In *Polydontes imperator* the terminal male organs are much as in *Zachrysia;* but there is a well-developed vagina (this being eliminated in *Zachrysia*), and a rather long spermathecal duct (short in *Zachrysia*). As a Cuban friend now possesses material for an anatomic study of the Cuban species of *Polydontes,* no further information need be given here.

All of the species have large, solid shells, which show more or less minute granulation produced by the intersection of spiral and radial lines, somewhat as if pressed on from a woven fabric. This is microscopic in some species. The animals have the peculiar faculty of self-amputation of the tail when disturbed, first described by Gundlach (Malak. Blätter, 1860, p. 83, and 1861, p. 14). He observed this in *P. sobrina, P. imperator* and *P. apollo,* and noted that he found an individual growing a new tail.

Shells of all the Cuban species except *P. sobrina* are illustrated on plate 3. It was worth a trip to Havana to see the fine new Polydontes which Dr. de la Torre has brought together. All of the figures of our plate, except fig. 6, are from specimens received from him.

The genotype is POLYDONTES IMPERATOR Montfort, Pl. 3, fig. 6. The "Emperor polydont," remarkable for the many blunt teeth on its thick lip, was the first species known. When Denys de Montfort described and figured it in 1810 it was a great rarity. "La plus rare de toutes les coquilles" he wrote, going on to say that he never saw a second specimen, either in natural condition or fossil. The habitat was vague: "Il vient des Indes, et il est terrestre." It has always been a scarce snail, living in rather inaccessible places, and possessed by few collections until Gundlach found it living under dead leaves at Mate, Baracoa, in 1861. It has recently been brought alive from La Uvilla, Jauco, on the south coast of Baracoa. Their shell-heaps show that the Cuban Indians consumed great quantities of these snails.

POLYDONTES SOBRINA[4] (Férussac), the "thick-lipped polydont," was the next species, defined in 1820 by figures of a bleached "bone" of unknown origin, about 47–48 mm. in diameter. Sub-

[4] *Sobrina* means a cousin on the maternal side; its application to this shell not obvious, but perhaps Férussac was thinking of its relationship with *P. imperator.*

sequently (1846) Pfeiffer described a fresh Cuban shell of the same species, collected by Lindon, as *Helix crassilabris.* In 1860 Gundlach found it at Yateras. Mr. C. T. Ramsden has collected fine specimens in the same region, on Monte Libano, Guantánamo, the diameter about 45 mm. In this species the periphery varies from bluntly angular to rounded. The color is dark, as in *P. natensoni maurus,* with many dark spiral lines. The penult whorl has distinct rounded granules rather closely scattered over a "woven" ground, thus differing from *P. natensoni* and *maurus,* which moreover, are more sharply angular. Very large "dead" or subfossil specimens occur, up to 56 mm. diameter. It is widely distributed in western Oriente. D'Alte Welch and I found it in woods north of the Cauto River, near Miranda.

POLYDONTES APOLLO (Pfeiffer), pl. 3, fig. 5, was the third species discovered. Pfeiffer described it in 1860 from a specimen of unknown locality, presumed to be Cuba from its relationships; but in 1861 Gundlach turned it up, and in a letter to Pfeiffer told of his joy at finding this charming snail. The "Apollo polydont" is a beautiful shell for its color and graceful lines. It is known from the top of the Yunque de Baracoa only.

POLYDONTES NATENSONI Torre, pl. 3, figs. 2, 2*a*, 3. "Natenson's polydont," described on a previous page, is a fine snail somewhat intermediate between *P. sobrina* and *P. apollo* in shape, but differing from both in the minute sculpture. The typical form resembles *P. apollo* in color, but the brunette race *P. natensoni maurus,* fig. 4, the "Moor polydont," is very dark, with many dark spiral lines.

POLYDONTES TORREI Pilsbry. "Torre's polydont" is, after *P. imperator,* the most distinct Cuban species of the genus. It is much more depressed than any other, the h/d index of the type being about 37.35. In *P. apollo,* the only species at all similar, the h/d index is about 57. It is a thinner shell than *P. apollo,* with different minute sculpture and more oblique aperture. The description of this species, which is named in honor of Dr. Carlos de la Torre, follows.

POLYDONTES TORREI, new species. Pl. 3, figs. 1, 1*a*, 1*b*.

The shell is imperforate, moderately solid, lens-shaped, the spire being very low conoidal, the periphery acutely carinate and the

base convex. Being "dead" the color is soiled white. Sculpture of rather fine, unequal, distinct but unevenly developed growth striae, which are strongly retractive on the upper surface, radiating on the base. On the first two whorls such striae appear below the suture only; other sculpture, if present, being lost by wear. On the last two whorls fine, close, radiating wrinkles crossed by spiral lines appear, lacking in places, and at short intervals there are wider radial wrinkles. The last whorl shows also a few short, forwardly descending impressions crossing the striae at right angles. On the base the radiating striae only are visible. The whorls are nearly flat on the upper surface, the last descending in front. The peristome is narrowly expanded above the periphery, reflected at the base, dilated over the umbilicus. It is everywhere strongly thickened within, and has a low but heavy callous prominence on the inner margin close to the columellar insertion.

Height 19.5 mm., diam. 49.5 mm.; 4½ whorls.

The type is from a cañada on the far side of the Rio Toa, Baracoa, collected by Mr. Natenson; No. 170967 A. N. S. P. Paratypes in the Torre collection.

Key to Cuban Species of Polydontes

1. Peristome set with numerous blunt, unequal teeth, *P. imperator* Montf.
   Peristome toothless except for an obtuse prominence close to the columella ..... 2.
2. Periphery strongly carinate ..... 3.
   Periphery strongly angular; penult whorl with irregular, smooth, short, radiating lines (fig. 2*a*) ..... *P. natensoni* Torre.
   Periphery bluntly angular or rounded; penult whorl granulose ..... *P. sobrina* (Férussac).
3. Moderately depressed, the height more than half of the diameter ..... *P. apollo* (Pfr.).
   Strongly depressed, the height less than half of the diameter ..... *P. torrei* Pils.

MARINE COLLECTING ON THE WEST COAST OF MEXICO

BY B. R. BALES, M.D.

It is not necessary to take a long sea trip to reach a locality rich in tropical mollusca. We spent the winter of 1937–1938 on the west coast of Mexico and had three fine months of shell collecting at Acapulco. The Laredo-Mexico Highway from Laredo,

Texas, to Mexico City, is a wonderful piece of engineering; it has a smooth crushed rock surface, no grade more than six percent, and is a perfectly safe road. From Mexico City to Acapulco, in the State of Guerrero, a distance of less than three hundred miles, more than half of the road is like the Laredo highway; the remainder is a well graded gravel road and easily negotiated by automobile.

The purpose of this paper is to give to other shell collectors the benefit of our experiences, should any wish to collect in this interesting region. Acapulco is situated in Mexico's west coast and is the oldest seaport on the Pacific coast of the Americas; it lies about sixteen degrees north of the Equator. There are several very fine collecting stations nearby—Playa Langosta, Playa Caleta, Isla de Roqueta, Los Hornos, are all sure to yield good shells.

We found that probably the best place to stay while at Acapulco was at Las Palmas Courts, just at the edge of the city where individual apartments are available. There is a central dining room where excellent food, both American and Mexican, is served. The prices are reasonable and one can don his bathing suit in his apartment and in less than a minute's time be in a good collecting location at Playa Langosta. All other hotels are located quite a distance from the water.

Tides affect marine collecting at Acapulco less than at most places, as the variation between high and low is not as marked as in some, but the wind affects collecting more than tides, and when there is windy weather, it is almost impossible to work in the water.

Most of the specimens were taken by rolling over stones and rocks; by the use of the water glass and by using Japanese water goggles when diving. In addition to personal collecting, many fine specimens were purchased from the dozen or more women who maintain small stands on the Plaza and who manufacture small trinkets, such as necklaces, beads and other articles from shells, to sell to tourists. Very often, choice specimens were obtained at a ridiculously low cost from this source. The most difficult shell to purchase, strangely enough, was *Dentalium semipolitum* Brod. & Sby., as the native women used them as "spacers" when making a necklace, using them alternately with other shells.

It was much easier to buy a specimen of *Pecten subnodosus* or a *Harpa!*

The habitat of some species in some cases differed from that of eastern coast members of the same family. This was especially true of the big handsome *Cerithium adustum nebulosum* Sby. Many adult specimens inhabited by hermit crabs as well as small living immatures were found, and for a time we were puzzled as to the whereabouts of the living adults, but one day at Isla de Roqueta, while moving stones imbedded in sand, searching for chitons, a large colony of fine large adults was discovered by scraping deeper in the sand.

Most interesting was the behavior of *Chiton albolineatus* Sby. Previous experience with members of this family had been, that when they were disturbed, they remained motionless. Not so with *albolineatus;* as soon as a rock under which they were hiding was turned, they immediately start to glide away to some place of security. The same proved true with *Tonicia forbesi* Cpr. These were invariably found under a cluster of sea urchins and protected by them. They were found on the tops of submerged rocks and as soon as the protecting sea urchins had been removed, the chitons would start to glide to some protected crack or other hiding place in the rock.

The various *Conus* were taken from the tops or sides of submerged rocks by diving, but at various times, they were taken from water not more than a few inches deep and on one occasion, one was left by the receding tide fully exposed on the top of a large rock. Most of the *Murex* were taken from depths of five or six feet of water at low tide and the same was true of *Vasum.*

One fertile source of fine specimens was the camp of the "pearl fishermen." These divers daily bring in their catch of *Margaritiphora mazatlanica* Hanl. and open them, searching for pearls. The shells are then roughly cleaned and shipped away by the barrel to firms who manufacture ornaments, etc., from the pearl shell. Many fine specimens of *Hipponyx, Crepidula, Crucibulum,* and others were obtained from them, and an occasional *Cardita* was found attached to the byssus of the "pearl shell."

Good sized colonies of *Astraea unguis* Mawe and the interesting *Leucozonia cingulata* Lam., were taken from protected places and

crevices among the large rocks that were exposed to rather rough waves.

The truly spectacular *Patella mexicana* Sby., attaining a length of eight or nine inches, was always seen on the tops of large rocks that were exposed to the roughest waves, and many extra large specimens were seen in places where the waves were so high that it was impossible to reach them. Collecting the large Patellas was always more or less dangerous due to these immense waves, and on one occasion, I was dashed against a cliff and into a colony of sea urchins. More than a hundred spines were later removed from my anatomy. The native name for this Patella is "Lappa" and one must be armed with a leaf from an automobile spring to pry them from the rocks.

The following is a list of species taken, and there is no doubt that the number could be more than doubled in another season's collecting, especially if a dredge is used.

Acanthina muricata Brod.
Acmaea aeruginosa Midd.
Acmaea discors Phil.
Acmaea fascicularis Mke.
Acmaea filosa Cpr.
Acmaea mitella Mke.
Acmaea pediculus Phil.
Anachis nigricans Rve.
Anachis pygmaeus Sby.
Anomalocardia subrugosa Sby.
Arca grandis Brod.
Arca illota Sby.
Arca mutabilis Sby.
Arca solida Brod. & Sby.
Architectonica granulata Lam.
Aspella obeliscus A. Ad.
Astraea unguis Mawe
Bulla gouldiana Pils.
Bulla punctata A. Ad.
Bursa albifasciata Sby.
Callistochiton elenensis Sby.
Callistochiton gabbi Pils.
Calliostoma eximium Rve.
Calliostoma lima Phil.
Calyptraea mamillaris Brod.
Cardita grayi Dall
Cardita radiata Sby.
Cardium consors Sby.
Cantharus sanguinolentus Duel.
Cassis abbreviatus Lam.
Cassis coarctatus Gray
Cassis sulcosa v. *centiquadrata* Val.
Cerithidea iostoma Pfr.
Cerithium adustum v. *nebulosum* Sby.
Cerithium gemmatum Hds.
Cerithium ocellatum Brug.
Cerithium stercus-muscarum Val.
Cerithium unicinctum Gmel.
Chaetopleura lurida Sby.
Chama buddiana C. B. Ad.
Chama echinata Brod.
Chione succincta Val.
Chione undatella Sby.
Chiton abolineatus Sby.
Chiton laevigatus Sby.
Columbella fuscata Sby.
Columbella major Sby.
Conus comptus Gld.
Conus gladiator Brod.

Conus nux Brod.
Conus princeps L.
Conus puncticulatus Hwass.
Conus purpurascens Brod.
Conus regularis Sby.
Crassispira aterrima Sby.
Crepidula aculeata Gmel.
Crepidula adunca Sby.
Crucibulum imbricatum Sby.
Crucibulum scutulum Gray
Crucibulum spinosum Sby.
Crucibulum umbrella Desh.
Cymatium gibbosum Brod.
Cymatium tigrinum Brod.
Cypraea arabicula Lem.
Cypraea cervinetta Kien.
Donax carinatus Hanl.
Donax petallinus Desh.
Donax punctostriatus Hanl.
Donax transversus Sby.
Dosina annae Cpr.
Dosina dunkeri Phil.
Engina tobagaensis Bartsch
Eupleura triquetra Brod.
Fasciolaria granosa Brod.
Ficus decussata Wood
Fissurella alba Cpr.
Fissurella nigrocincta Cpr.
Fissurella rugosa Sby.
Fusus dupetithouarsi Kien.
Glycimeris gigantea Rve.
Harpa crenata Swain.
Hipponyx grayanus Mke.
Hipponyx pilosus Desh.
Ischnochiton limaciformis Sby.
Ischnochiton muscarius Rve.
Laevicardium elenensis Sby.
Latirus castaneus Rve.
Latirus ceratus Gray
Latirus rudis Rve.
Leucozonia cingulata Lam.
Lima pacifica Orb.
Lima tetrica Gld.
Lithophagus aristatus Dall
Lithophagus plumulus Hanl.
Littorina aspersa Phil.
Littorina conspersa Phil.
Lucapinella inaequalis Sby.
Macrocallista aurantica Hanl.
Macrocallista squalida Sby.
Mactra exoleta Gray
Malea ringens Swain.
Margaritiphora mazatlanica Hanl.
Mazatlania fulgurans Phil.
Melampus olivaceus Cpr.
Melanella micans Cpr.
Melongena patula Brod. & Sby.
Mitra lens Wood
Mitra tristis Brod.
Mitrella ocellata Gmel.
Mitrella ocellata v. *guttata* Sby.
Modiolus capax Con.
Modulus disculus Phil.
Morum tuberculosum Sby.
Murex bicolor Val.
Murex brassica Lam.
Murex elenensis Dall
Murex hippocastaneus Phil.
Murex nigritus Meusch.
Murex oxycanthus Brod.
Murex princeps Brod.
Murex regius Wood.
Mytilus adamsianus Dkr.
Mytilus palliopunctatus Dkr.
Nassarius bailyi Pils. & Lowe
Nassarius corpulenta C. B. Ad.
Nassarius versicolor C. B. Ad.
Natica catenatus Phil.
Nerita ornata Sby.
Neritina punctulata Lam.
Olivancillaria hiatula Gmel.
Olivella gracilis Gray
Olivella volutella Lam.
Ostrea mexicana Sby.
Paphia staminea Con.
Patella mexicana Sby.
Pecten subnodosus Sby.
Pedalion anomioides Rve.
Pinna rugosa Sby.

Pitar affinis Gmel.
Pitar alternata Brod.
Pitar lupanaria Less.
Pitar unicolor Sby.
Planaxis nigritellus Fbs.
Plicatula dubia Han.
Polinices glauca Han.
Polinices otis Brod. & Sby.
Pustularia pustulata Lam.
Pyramidella panamensis Dall & Bch.
Rissoina stricta Mke.
Sanguinolaria tellenoides A. Ad.
Saxicava arctica L.
Semele flavescens Gld.
Semele simplicissima Pils. & Lowe
Siphonaria lecanium Phil.
Siphonaria maura palmula Cpr.
Siphonaria pica Sby.
Sistrum ferrugineum Rve.
Spondylus calcifer Cpr.
Strigella fucata Gld.
Strombus galeatus Sby.
Strombus peruvianus Sby.
Surcula olivacea Sby.
Tegula impressa Jonas
Tegula mariana Dall
Tegula rubroflammulatum Koch.
Tegula viridulum Gmel.
Tellina moeropsis Dall
Terebra albocincta Cpr.
Terebra luctuosa Hds.
Thais biserialis Blv.
Thais patula L.
Thais triangularis Blv.
Thais triserialis Blv.
Tivela planulata Brod. & Sby.
Tonicia forbesi Cpr.
Trivia pacifica Gray
Turritella goniostoma Val.
Turritella tigrina Kien.
Vasum caestus Sby.
Vermetes centiquadratus Val.
Vermicularia pellucida Brod.

ON THE PROBABLE CAUSE OF CERTAIN VARIATIONS IN COLOR OF THE SHELL IN THE GENUS *LIGUUS*

BY DR. RICARDO DE LA TORRE
University of Habana

Studying carefully the coloration in the different species and varieties of land snails included in the genus *Liguus,* we can observe that the coloration is highly variable from the young to the adult; moreover, as the turns or whorls of the spire remain exposed in this genus, the coloration changes notably from the apex to the last whorl. This variation in coloration is practically infinite. At first glance it does not seem to follow any rule or arrangement; but as we study the different types of coloration and its multiple combinations it is possible to observe that they follow certain standards, which we will attempt to decipher so as to indicate the probable underlying causes.

We will describe first the different types and afterward their combinations.

In the first place it is possible to consider the patterns in two large groups, according to whether the color dyes the periostracum or the shell.

In the genus *Liguus* the periostracal coloration is confined to green spiral lines, variable in number and width, and present in nearly all specimens. These green periostracal lines are not subject to variation with age, and they remain constant in cases of melanism, xanthism, or albinism, so frequent in *Liguus*. At the same time, each green periostracal line ends in a notch in the outer lip of the shell which is thereby crenulated. This character is produced with or without the existence of other lines or colors, and was referred to by Swainson in naming the variety known as *Liguus fasciatus crenatus* Swainson.

This name is usually applied to all forms which possess green lines only on a white ground, or in other words, forms which are *albinos* so far as color of the shell under the periostracum is concerned. This actually includes as many albinos as there are species and varieties in the genus. This is very easy to demonstrate by comparing the shape of each of them with that of the albino having green lines only.

The other patterns of coloration belong properly to the shell, not to the periostracum, and form more or less continual spiral lines and bands (never green), and alternating, dark and light, complete or incomplete, flame shaped, transverse bands, that may coexist or not with the others.

Let us see now the distribution of this different type of coloration upon the shell. The shell has a white background on which the colors are distributed, covering it sometimes completely (melanism). The spiral bands are disposed in two series, one in the visible portion of the spire, the other basal, leaving between them a wide band that may bear in the middle a central dark line corresponding to the sutural line. In both zones, limited by the bands, are disposed the alternating bands that may be so short as to be merely series of spots (*Liguus blainianus* Poey, *Liguus pictus* Reeve, etc.). The alternating bands may become cloudy.

We are going to see now the disposition of color in different

portions of the shell. The embryonic shell, first and second whorls, are uniformly colored (white, pink, or brown); in the third, fourth and fifth whorls predominate the alternating bands, very well defined; in the sixth and seventh the alternating bands may become cloudy; in the last portion of the seventh whorl all coloration disappears gradually or abruptly, totally or partially, with the sole exception of the green periostracal bands. These do not vary at all, or they may become strongly marked. All other spiral lines vary in color and intensity with the growth of the shell.

Probable causes of some of these variations.—It has been observed that food may change coloration (some melanic forms by tannin), but color-changes during life cannot be thus explained.

If we observe carefully the life of *Liguus* we will detect that the first important change coincides with sexual maturity, then the second, and the last comes with old age, the intense coloration disappearing more or less abruptly, leaving only well and persistently marked the green periostracal lines; so it appears that the changes correspond to the appearing and the disappearing of the sexual hormones. These changes exist also in other genera.

A NEW PSEUDOCHAMA FROM CLARION ISLAND, MEXICO

BY G. WILLETT

One of the results of a recent trip to islands off the west coast of Mexico was the discovery of a *Pseudochama* that does not appear to have been hitherto described. It may be known as:

Pseudochama clarionensis, new species. Pl. 4, figs. 1, 2.

Shell sinistral. Upper valve roughly circular, flattened; with irregular, rugose, spiral wrinkles; posterior three fourths of the valve decorated with short, laminated, grooved spines; anterior margin with several projecting, spatulate folds. Lower valve rather flat; attached for the greater part of its area; unattached portion with low, rugose cords running in various directions, and sparsely ornamented with thin, projecting laminae. Ground color of both valves bright salmon-red, spines and folds usually white, but some of the latter colored red like the main part of the shell. Color of interior white, clouded with rose. Each valve

with a single serrated tooth which fits into a pit in the opposite valve. The tooth in the lower valve is the largest and most deeply serrated. Inner margin of both valves crenated all around except in hinge region. Greatest diameter of type, 23 millimeters.

TYPE: No. 1058, paratype No. 1058a, Los Angeles Museum; dredged by G. Willett in 30 fathoms off southwest side of Clarion Island, Mexico, March 24, 1938. Many additional upper valves secured, but very few complete specimens, the lower valves being firmly attached.

This species somewhat resembles *P. granti* Strong, from Catalina Island, California, but differs in slightly larger size, much more brilliant coloration, more rugose upper valve with its submarginal folded fronds, and much more shallow lower valve.

A specimen of *P. granti* was dredged in 25 fathoms at the San Benito Islands, this constituting a southward extension of the known range of that species.

A NEW TURBONILLA FROM REDONDO BEACH, CALIFORNIA

BY MACKENZIE GORDON, JR.

During the months of May and June, 1938, I had the pleasure of doing quite a bit of dredging off Redondo Beach, California, with Mr. John Q. Burch of that town, and his son, Tom Burch. We concentrated on a gravel bed a few acres in extent about a mile off shore and succeeded in sorting through about a ton of material. As seems inevitable when a locality is carefully worked, a new species of *Turbonilla* turned up for which I submit the following description:

TURBONILLA (PYRGISCUS) BURCHI, new species. Pl. 4, figs. 3–5.

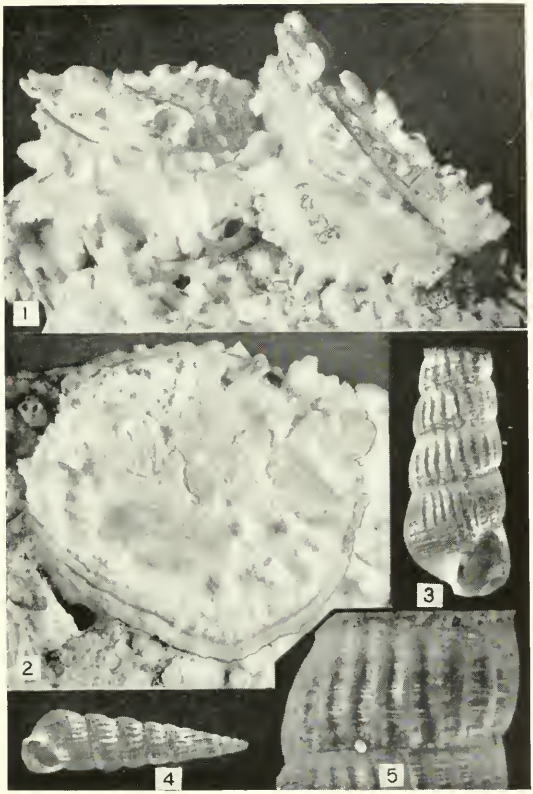
Shell large, broadly-conic, flesh-colored with a wide brown band which extends from one-fourth the distance from the suture to the periphery, to one-fourth the distance from the periphery to the columella. Early nuclear whorls broken away; remaining half-turn smooth, slightly oblique, and slightly immersed in the first post-nuclear whorl. Post-nuclear whorls rounded, slightly appressed at the summit, marked on the early whorls by rather strong, almost vertical, rounded, axial ribs, which become slightly

retractive on the last three whorls. Of these, there are 14 on the third, 16 on the fourth to sixth, 17 on the seventh, 18 on the eighth, 20 on the ninth, 22 on the tenth, and 28 on the last whorl. The spiral sculpture consists of heavily incised lirae or elongated pits and finely incised lines. There are five rows of the elongated pits: the first, second, and fourth of equal strength, and the third and fifth slightly stronger. The first of these marks the posterior boundary of the brown color band, the second is just anterior to it, the fifth is almost at the periphery, the fourth is the same distance posterior to it as the first to the second, and the third is half way between the second and fourth. The flesh-colored area in front of the suture is marked by five finely incised lines of equal strength and equidistant except for the third and fourth which are set slightly farther apart. There are two finely incised lines between the first and second rows of spiral pits, two between the second and third, three between the third and fourth, and none between the fourth and fifth. The spiral sculpture does not cross the summits of the axial ribs though several of the rows of spiral pits encroach well upon the slopes. The periphery is well-rounded and marked by a smooth area as wide as that separating the fourth and fifth rows of spiral pits. A few of the axial ribs cross the periphery but these evanesce quickly. The base is well-rounded and marked by eighteen fairly strong, subequal, spiral grooves which are unequally spaced. Aperture moderately large, rhomboidal; posterior angle acute; outer lip thin, showing the sculpture within; columella moderately thin, oblique, revolute, but almost straight; parietal wall covered by a thin callus. The type possesses eleven whorls and measures: height, 10.4; greatest diameter, 2.9 mm.

Holotype: No. 1057 Los Angeles Museum coll., dredged at 25 fathoms in gravel, one mile west of the pier at Redondo Beach, California, by M. Gordon and J. Q. Burch in June, 1938. Two paratypes, one Cat. No. 1746 in the California Academy of Sciences Paleo. Type Coll., and the other Cat. No. 1626 in the author's collection, were collected with the type.

A study of the paratypes shows that the finely incised spiral lines do not constitute a constant character, the specimen in the author's collection possessing twelve of these in the flesh-colored zone anterior to the first row of spiral pits. The rows of spiral pits, however, are always five in number though varying in strength from the type, and are especially apparent on the earlier post-nuclear whorls.

This species is evidently most closely related to *Turbonilla*



1, *Pseudochama clarionensis* Willett, side view of type and paratype; 2, upper side of type, all × 2.

3, *Turbonilla* (*Pyrgiscus*) *burchi* Gordon, last four whorls × 5; 4, the shell × 3; 5, antepenult whorl × 12.

(*Pyrgiscus*) *dora* Bartsch but differs from that species in being banded, in having stronger and less numerous axial ribs on all the whorls, less appressment at the suture, a different pattern of spiral sculpture, and not as many spiral grooves on the base.

The species is named for Mr. John Q. Burch, of Redondo Beach, California.

A CRUDE NUMERICAL EXPRESSION FOR THE BRILLIANCE OF GASTROPOD SHELLS

BY E. A. ANDREWS
Johns Hopkins University

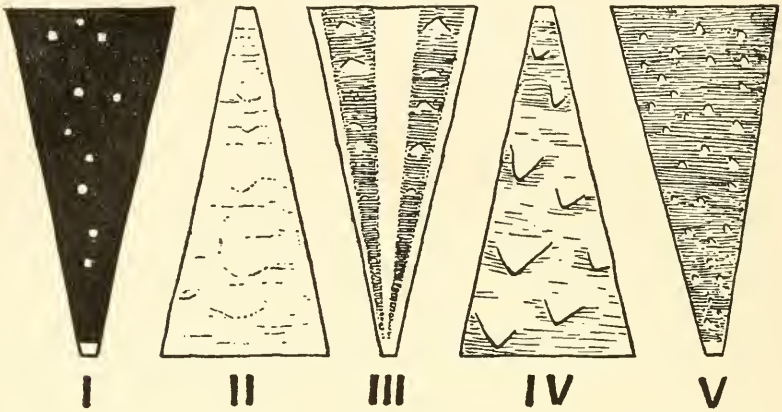
In Jamaica, B. W. I., the shells of *Neritina virginea* differ greatly in color, in pattern and in intensity of light reflected from their surfaces, not only in any one locality but in populations living in various fresh, brackish and salt waters. Thus in the Great Salt Pond, Ft. Clarence, very light shells were found by Metcalf in 1891, in water of density 1.0380, while in 1910 shells collected there were quite light, in water of density 1.0258–60–75 and decidedly darker in water of density 1.0174, in part of the same pond.

To express the intensity of reflected light thus found correlated with density, some numerical expression was sought for the terms "light" and "dark." In 1931 Professor A. H. Pfund had the kindness to supply this need by measuring for me the light reflected from one hundred shells from each of the above three densities as compared with the light from magnesium oxide, and he found that the darker shells from density 1.0174 reflected but 9 per cent while those from density 1.0258–60–75 reflected 18 per cent, and those from density 1.0380 reflected 37 per cent.

By 1936 some thirty-three collections of these shells from sixteen localities had been made, and the differences in brilliance noted. To express these differences numerically it was suggested by Professor Pfund that individual shells be compared with magnesium oxide by means of a photometer. I am indebted to Dr. L. B. Shettles for setting up the photometer that he had been using.

To make use of individual shells to represent a community it was necessary to select a proper one from the very diverse individuals of any locality.

While Metcalf had pointed out that the endless individual diversities might be grouped arbitrarily into classes that graded into one another, we found that one such grouping seemed of more value, as in any large collection from either salt or fresh water there are shells that fall into the five groups indicated in the diagram. In this diagram we represent the surface of the shell as



unrolled and projected so that the base of the triangle is the mature part of the shell and the apex the very young shell still without the color and pattern that it later assumes and, generally, holds constant through its life.

In group I we place shells that are melanic, either pure black or with small scattered light spots on dark background. In II shells that are albinic with pale ground and very little pattern. In III shells that exhibit at least one equatorial band of light, free from pattern, or rarely an obscure band of red, or sometimes banded arrangement of small spots. In IV are the common shells that are blotched with very diverse patterns of angular areas of dark on light ground. In V, minute spots or dots represent the light areas outlined by the angular pattern of IV.

Census of populations showed that in saline waters shells in group IV were much more numerous than in the other groups, while in fresh waters shells in group V are the most numerous.

For example in the above intermediate locality in which one hundred shells gave reflected light 18 per cent of that from the

oxide, the entire population of 28212 shells fell into the above groups as follows: in I 5%, in II 4%, in III 19%, in IV 63% and in V 8%.

The light coming from these shells is made up of the light ground, whitish or yellow with occasional red or bluish; of the pattern that is resolvable into fine meridional lines of dark; and in addition the high lights made by reflection from the generally highly polished surface. To give value to these high lights the shells were put below the focus of the microscope and thus a blurred composite light compared with the light from the movable bulb of the photometer.

We found that in the above collection of 28212, shells of I gave 6–12%, of II 20–40%, of III 16–40%, of IV 20–40%, of V 20–33%. On the other hand the large, dark shells in the cascades of the Great River compared with the oxide showed: in I 4%, in II 20%, in III 20%, in IV 13%, and in V 20%.

In the thirty-three collections from sixteen localities the light reflected by an average shell of group IV or of V was taken to represent the entire community, though obviously there were many shells that were darker and many lighter, but they were minorities. The selected representatives from salt environments gave values of 19–48 per cent and those from fresh waters 12–22 per cent. Thus, as emphasized by Metcalf, *Neritina virginea* in Jamaica shows marked correlation between salinity and brilliance of shell.

It is also very conspicuous that saline forms are small as compared with fresh. However, salinity is not the only factor in which fresh and salt environments differ. Doubtless the food available may differ and, though unfortunately not measured, the light that falls upon the snails seems to differ since the small brilliant shells are found in clear sea water that is not shaded and seldom turbid and at depths of but a few inches, or less, that the sunlight penetrates with heat, light and short rays; while the larger darker fresh water forms live deeper, were often shaded, and in water frequently turbid, and thus they are exposed less to all the rays of the sunlight.

It may be that toward the solution of the problem of the effects of environment upon these snails some attention should be given to the amount and character of the light that falls upon them during

most of their life, as this may well be significantly correlated with the brilliance of the shell itself. Unfortunately the light received and that reflected have not been measured in light units, but the present method of comparing the brilliance with a standard may have some reconnaissance value.

It can be applied to other gastropods. Thus at Sandy Bay *Nerita tristis* gave values of 21% which compares with the average of *Neritina virginea* there of 28%, and these two crawling together have some resemblances in patterns that may lead to mistaking one for the other.

A NEW SPECIES OF STENOTREMA FROM EAST TENNESSEE

BY ALLAN F. ARCHER

STENOTREMA WALDENSE, new species. Text figure 1.

Description.—Shell small, imperforate, rather solid, subglobose, dull. Color varying from very light chestnut-brown on body-whorl to dull ivory on earlier whorls. Cuticle horny brown. Peristome and parietal lamella very pale ivory. Whorls 5, rather gently increasing, moderately convex, nuclear whorl somewhat convex. Suture gently impressed. Body whorl slightly bulging behind peristome, and having a faintly angular periphery. Base of body-whorl rather convex. Aperture narrow and transverse. Outer peristome flaring outwards, rather narrow, becoming in-

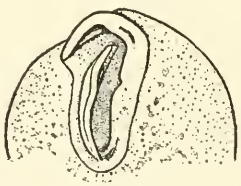


FIG. 1.

creasingly narrow where it joins the body wall. Basal peristome rather narrow. Anal sinus gently rounded. Subanal denticle weakly angular. Interdenticular sinus quite broadly curved and having a flat surface. Outer and basal denticle on either side of the notch undifferentiated from inner rim of peristome. Notch v-shaped, very reduced and narrow. Parietal lamella simple, very gently arched and not prominent; proportionately short, its distal end not descending deeply into the aperture in the vicinity of the

interdenticular notch. Parietal callus rather narrow, curving upwards where it meets termination of outer peristome. Eroded nuclear whorl showing faint traces of axial striation. Succeeding whorls possessing fine axial riblets, a little irregularly spaced and occasionally interrupted. Beginning at about the fourth whorl and continuing to the edge of the peristome the surface is covered with fine, rather closely crowded spiral lines. Height 6 mm., greater diameter 8 mm., lesser diameter 7.8 mm.

Holotype.—A. N. S. P. No. 168938, from Doaks Creek, Campbell County, Tennessee. Paratypes in the collection of the Museum of Zoology, Ann Arbor, Michigan. A. R. Cahn collector, 1937.

Remarks.—The specimens collected are all dead adults, and it would be desirable to obtain live material in order to get a better idea of the color of the shell and other useful data. This species is evidently distinct from any other *Stenotrema.* It is quite probable that its nearest relative is *Stenotrema edvardi* (Bland); its sculpture indicates that live specimens would probably have thorn-like cuticular hairs similar to those of *edvardsi.* It differs from the latter in the following ways.

S. waldense	*S. edvardsi*
1. Parietal lamella proportionately short, its distal end not deeply descending into the aperture.	1. Parietal lamella proportionately long, deeply descending into the aperture.
2. Peristome rounded and blunt	2. Peristome strongly angular.
3. Shell subglobose.	3. Shell lenticular.

The whorls are also more rapidly increasing than in *edvardsi. Stenotrema waldense* may be distinguished at once from *S. hirsutum* by the fact that the distal end of the parietal lamella does not descend deeply into the aperture as in the case of the latter. In this respect it also differs from *S. stenotrema,* and also by the narrow basal peristome. *S. waldense* can, moreover, be distinguished from *S. altispira* by possessing a fine, narrow notch, a shallow basal peristome and a convex base, while in the latter the notch is wide and gaping, the basal peristome is broad, and the base of the shell is quite flattened.

This snail is named for the Walden's Ridge area in which it occurs.

A COLLECTION OF FRESHWATER SHELLS FROM KAMCHATKA

BY W. J. EYERDAM

The Kamchatka peninsula which is surrounded by the sea on three sides and bordered on the north by a vast treeless tundra, might be regarded from a biological standpoint as an island. One would expect its flora and fauna to represent a great array of endemic species, but such is not the case. The flora, which is far from original, consists largely of circumpolar and subalpine plants. The fauna is meager in species and consists mostly of forms having a wide range in the circumboreal regions. Local races are not sharply defined and represent a more recent development in evolution.

The general impression that one receives upon a study of the flora is one of violent volcanic catastrophes on a grand scale and of great ice masses that have displaced and pauperized the vegetation of pre-Quaternary period. After the glacial times Kamchatka was restocked by Arctic biological forms. Through glacial and volcanic destruction very few refugia or glacial islands have persisted down to the present, so there are not many relict biotic species to be found in the peninsula. The Winters are long and cold and the Summers are short and hot. Deep snow persists right down to the sea until May. Sometimes drifts of snow cover certain valleys until July, and often there are violent eruptions in this land of over 100 volcanoes, that destroy all the vegetation within the area of hundreds of square kilometers.

As a result of unfavorable conditions one cannot expect to find an abundance of molluscan species. The total known land snail fauna is about fifteen species.

In the Summer of 1925 while engaged on a salmon fishing excursion to the mouth of the Kamchatka river for a Seattle mild cure concern, I had occasion to go ashore from the schooner *Apollo* and collect shells and plants during spare time. Again in 1928 while engaged in collecting plants for the well known Swedish botanist, Dr. Eric Hulten, I collected freshwater shells in the region around Avatcha bay in South Kamchatka. The only large river in this region is the Avatcha river and no shells could be

found in the stream bed itself. Ponds with growing vegetation, as elsewhere, favor the growth of molluscs which were taken in such places.

Most of the following freshwater shells that I collected were kindly classified by Dr. C. Goodrich after the death of Dr. Bryant Walker to whom I had submitted them in 1931. The identifications are based mostly on Westerlund's descriptions and I believe by comparison of species in the Walker collection. There are three species in the lot that were not reported previously from Kamchatka.

1. *Pisidium dilatatum* Westerlund, 1928. Savoika in a pond. July, 1925. Not common.

2. *Pisidium sibiricum* Clessin. In mud amongst stones and pebbles of a swiftly running brook which freezes solid in winter. Gulf of Kronotski about 20 miles south of the mouth of Kamchatka river. Not common.

3. *Anodonta beringiana* Midd. One specimen in August, 1925, in a flood plain pond near the mouth of Kamchatka river.

4. *Margaritana margaritifera* L. In 1925 in the Kamchatka river. One valve.

5. *Lymnaea pervia* Mts. August, 1928. Not common. Dark green horn color. In ponds along Avatcha river on *Callitriche verna* L., *Potamogeton filiformis-pers* Laest. *Potamogeton gramineus* L. and *Sparganium hyperboreum.* In a tundra pond on Mt. Polovinaja near Savoika in July, 1928. Light horn color. On *Potamogeton graminicus* and *Sparganium hyperboreum.* In a small lake at Petropavlovsk on stones and on *Ruppia spiralis* L. in July, 1928. At Port Arthur, Manchuria, October 28, 1928, in a rice irrigation ditch. Abundant. These are larger than the Kamchatka form.

6. **Lymnaea atrata* Westerlund. August, 1928. Abundant around the Nulichevo hot springs. This species is said to be common in most of the larger hot springs of Kamchatka but does not seem to occur elsewhere. The flora of these hot springs is quite unique and many of the plant species are found only in such places in Kamchatka.

---

* New to Kamchatka.

7. *Lymnaea ovata* (Draparnaud) Westerlund. July, 1925. Ustj Kamtchatsk in a flood plain.

8. *Lymnaea aberrans* Westerlund. August, 1928. Malka hot springs in 30 degrees Cent.

9. *Lymnaea palustris* Müller var. *terebra* Westerlund. July, 1925. Ustj Kamtchatsk in a flood pond.

10. *Lymnaea stagnalis sorensis* Dybowski. July, 1925. Ustj Kamtchatsk in a flood pond.

11. *Valvata sibirica* Middendorff. This species is reported by Rosen from Kamchatka and its range is from northern Sweden to N. E. Siberia. In 1932 I found it in lakes on the islands Unimak, Unalaska, and Atka in the Aleutians. I did not find it in Kamchatka.

12. *Planorbis* (*Gyraulus*) *exilis* Westerlund. September 1, 1928. In a mountain tundra pond on Mt. Polovinaja on *Potamogeton* and *Sparganium*.

13. **Planorbis contortus* L. July, 1928. Two specimens in a flood pond at Ustj Kamtchatsk. Not typical. Determined by Vanatta.

14. **Planorbis exilis* Westerlund. In flood plain ponds at Petropavlovsk, July, 1928. Savoika on Avatcha river, July 20, 1928, and at Harbin, Manchuria, October 12, 1928.

15. *Bithynia robusta minor* von Moellendorff. In a flood pond of the Sungari river near Harbin, Manchuria, October 12, 1928.

The Kamchatka river which is nearly as large as the Columbia, harbors practically all the fluviatile molluscs of Kamchatka, and the same species are to be found in most of the great river systems of Siberia and northern Russia. Little seems to be known about the shells of thermal springs and their distribution except that most of them are species of Lymnaea. Perhaps they have been distributed in the larval stage by the agency of water birds.

In 1908–1909 an adjunct of the great Riabusinski biological expedition to Kamchatka, Baron von Rosen published a report on the land and freshwater shells that were collected in that region. The paper is printed in Russian and lists 14 terrestrial and 31 freshwater species. The title is "Mollusques terrestres et d'eaux douces, recueillis au Kamtschatka par l'expedition de Mr. Th.

* New to Kamchatka.

Riabusinsky en 1908–1909'' Annuaire du Musée Zoologique de l'Acad. des Sciences de L' U. S. S. R. 1926. pp. 262–274, by O. V. Rosen.

As this paper is apparently quite unknown and almost inaccessible in America, I include the following species that are in this report but are species that I did not find.

Nearly all of these forms were collected in the Kamchatka river. Unfortunately I had only about one hour of collecting in that stream in 1925.

The following list of shells are in Rosen's report but are not in the collection of Eyerdam. They are:

Gulnaria auricularia lanuginosa Dybowski.
" *ovata* var. *patula* Westerlund.
" *kamtschatica* Midd.
" *peregra* Drap. var. *middendorffi* Dybowski.
" " " *pseudo-elongata* Dybowski.
Lymnaea palustris Müller var. *fusca* Pfeiffer.
Fossaria truncatula sibirica Westerlund.
Physa hypnorum L.
Planorbis borealis Lovén.
" " var. *dershavini* Rosen.
" *moellendorfi* Dybowski.
" *kamtschaticus* Westerlund.
Bithynia leachi Schp. var. *inflata* Hans. * This Bithynia may be the same form as I found in October, 1928 at Harbin, Manchuria, which Goodrich classified as *B. robusta minor* Moellendorff.
Valvata stelleri Dybowski.
Sphaerium asiaticum Mts.
" *nitidum* Clessin.
Calyculina lacustris Müller.
Pisidium amnicum Müller.
" *nordenskiöldi* (Clessin) Westerlund.
Margaritana middendorffi Rosen.

These shells are in the collection of the museum of the Academy of Sciences in Leningrad, and the others are in the collection of Eyerdam.

VALVATA PISCINALIS (MÜLLER) IN THE GREAT LAKES

BY JOHN OUGHTON

(*Continued from page 327*)

Summary of the Known Range in the Great Lakes.—The above statement shows that *V. piscinalis* is well established and widespread in Lake Ontario, where it is known to occur from Belleville on the east to Port Dalhousie on the west. It seems likely that further search on the southern shore will establish a greater range there than the two records would suggest.

The single shell reported by Mr. Blakeslee (in letter) from Lake Erie (a well collected region) may be the vanguard of the invasion of the species into that lake. Such encroachment would likely take place via the Welland Canal, since *V. piscinalis* is common at the Lake Ontario end of this ship channel.

Habitat and Abundance.—In the Great Lakes, *V. piscinalis* apparently thrives in protected sites, as it does in its European haunts. Thus in the vicinity of Toronto it is most abundant by far in the well-protected lee of the breakwater at Sunnyside Beach, while it is only moderately abundant at Toronto Island in Toronto Bay, where there is a mile exposure of open water, and it is uncommon on the lake side of Toronto Island (only 2 shells were found in a 100-yard strip of beach examined), which was exposed to the open lake. Any discussion of abundance in a given area must therefore take into consideration the types of habitats available.

In order to obtain a precise estimate of the population of the present species, extensive sampling and dredging of the animals in life would have to be carried out. Lacking this information, the writer offers two rough standards of comparison, based on the numbers of dead shells found on the beaches at Toronto.

1. Number per unit time of collecting. Location, Lake Ontario, near mouth of Humber River (Sunnyside Beach) behind breakwater. (a) Fall, 1913. Justice F. R. Latchford informed the writer that he obtained about 15 to 20 shells in about one-half hour. (b) On a site of moderate density of drift shells, the writer collected 128 shells in 15 minutes, Dec., 1937.

2. Random collecting, *i.e.*, number per unit area of beach. Four samples were obtained by scooping up all the shells within marked-off areas: Lake Ontario. (a) Toronto Island, Toronto Bay, May 22, 1937.

	Sample A	*Sample B*
Total number of shells collected	35	142
Total number of species collected	10	14
V. piscinalis	23%	18%
Bulimus tentaculatus	37%	42%
Amnicola spp.	6%	14%
Gyraulus parvus	11%	4%
Physa spp.	9%	5%
Other aquatics	14%	17%

(b) Sunnyside beach, behind the breakwater (May 21, 1937 and Dec. 19, 1937).

	Sample A	*Sample B*
Total number of shells collected	153	1482
Total number of species collected	11	33
V. piscinalis	20%	34%
Gyraulus parvus	68%	46%
Physa spp.	3%	7%
Sphaeriidae spp.	1%	3%
Other aquatics	8%	10%

Details of Its Introduction.—There is no precise information at hand concerning the date, locality, means or source of introduction. *V. piscinalis* probably first colonized the western part of Lake Ontario, since in this area it seems to be most abundant now (*e.g.*, two suitably protected sites were examined in eastern Lake Ontario in 1936, and the species was uncommon or absent). The date of introduction was probably not much prior to 1898, as there is no mention of it in earlier lists, *viz.*, A. W. Hanham, "List of the land and freshwater shells of the Hamilton district . . . ," Journ. & Proc. Ham. Assoc., pp. 111–120, 1890, and H. A. Nicholson, "Contrib. to a Fauna Canadensis . . ." Can. Journ. n.s., 3: 490–506, 1872. In fact, Nicholson collected in the shallows of the bay at Toronto Island, where it is now common.

Variation. The sixteen hundred shells of *V. piscinalis* from Lake Ontario contained in the collections of the Royal Ontario Museum of Zoology belong in the writer's opinion to the typical form of *V. piscinalis,* although series of the European varieties are lacking for comparison. Thirty-five of the largest specimens in this collection were selected and measured, with the following results: Number of whorls, average $3\frac{3}{4}$, extremes $3\frac{1}{2}$ and $4\frac{1}{4}$; length, average 5.0 mm., extremes 4.0 and 6.1; breadth, average 5.2 mm., extremes 4.5 and 6.0. In most instances the breadth is equal to, or greater than, the length. These figures differ slightly from those given by Ellis in "British Snails" 1926, p. 87: 5 or 6 whorls, breadth 5 to 7 mm., height slightly more. The variation in the Lake Ontario shells is noticeable but small with respect to the elevation of the spire, size of umbilicus and the sculpture (malleation).

Mr. F. C. Baker noted (in letter) that there was considerable variation in his lot of shells.

SUMMARY

1. *Valvata piscinalis* (Müller), which was first reported from Lake Ontario in 1898, now has a wide range in that lake, and may be spreading into Lake Erie.

2. Judging by the number of dead shells washed up, this species at Toronto has greatly prospered during the last twenty-four years, so that now it comprises about one-quarter of the total molluscan population of protected parts of Lake Ontario at this city.

3. The details of its introduction are unknown.

4. Only the typical form of *V. piscinalis* has been found.

THURAL DALE FOSTER

(September 27, 1897—June 6, 1936)

Thural Dale Foster entered the University of Illinois as a graduate student in the summer of 1929. He had taught for five years in the high schools of Lamoille, Cambridge, and Geneseo, Illinois, after receiving the Bachelor's degree from Shurtleff College in 1924. In September, 1929, he became a graduate assistant in zoology in the University of Illinois, a position which he held until his death on June 6, 1936, except for one year when an at-

tack of Hodgkin's disease, which ultimately caused his death, forced him to interrupt his studies. He was granted a Master's degree by the University in June, 1931, and the Ph.D. degree was conferred on him posthumously on June 8, 1936.

He early became interested in Mollusca and completed a number of life history and biological studies which gave evidence of his promise as a research worker. He spent the summers of 1931 and 1932 as Assistant Field Zoologist in the Illinois State Natural History Survey, working under the direction of Frank C. Baker on a survey of the land mollusks of Illinois.

His courage and intense interest in research are reflected in the spirit with which he continued his work after being stricken with an incurable affliction. He is survived by his wife, Frances Claytor Foster.

A list of his published papers is appended.

Foster, T. Dale, 1931
Observations on the life history of a fingernail shell of the genus Sphaerium. (Abstract). *Trans. Ill. St. Acad. of Sci.*, 24(2) : 165–166.

————, 1932
Observations on the life history of a fingernail shell of the genus Sphaerium. *Jour. Morph.*, 53(3) : 473–497.

————, 1933
Shell injuries of land mollusks. *Trans. Ill. St. Acad. of Sci.*, 26(2) : 131.

Foster, T. Dale, and William C. Van Deventer, 1933
A comparative study of river, pool and pond communities, with special reference to the Sphaeriids. (Abstract). *Trans. Ill. St. Acad. of Sci.*, 26(2) : 132.

Foster, T. Dale, 1936
Biology of a land snail, Polygyra thyroides (Say). Printed abstract of Ph.D. thesis. 13 pages.

————, 1936
Size of shell in land snails of the genus Polygyra with particular reference to major and minor varieties. *Amer. Mid. Nat.*, 17(6) : 978–982.

————, 1937
Productivity of a land snail, Polygyra thyroides (Say). *Ecol.*, 18(4) : 545–546.

Van Cleave, H. J., and T. Dale Foster, 1937
The seasonal life history of a land snail, Polygyra thyroidus (Say). *The Nautilus*, 51(2) : 50–54.

H. J. Van Cleave,
University of Illinois.

DOCTOR FRED BAKER

The death of Dr. Fred Baker on May 16th, 1938, marked the end of an era. A pupil of Dr. Wesley Newcomb and the intimate friend and associate of the veteran collector Henry Hemphill, he was one of the last survivors of the pioneer period of West Coast malacology.

Dr. Baker was born in Norwalk, Ohio, on January 29th, 1854. In 1870 he matriculated at Cornell University in Civil Engineering; but his interest in natural science was such that he soon changed to a pre-medical course designed also to train naturalists.

While yet at Cornell he had six months in Europe with Albert N. Prentiss, professor of botany, with studies in Kew Gardens. His first formal work was done under professor Charles Fred Hartt, in Spirifers, and was the link which caused Dr. Hartt to place him in the way of a trip to Mexico and Central America with the eminent Russian meteorologist, Dr. Woiekoff. The stay here was extended to four years, during which he tried several ventures, among them building roads for the Guatemaltec government with crews of full blooded Indians. Here he acquired a speaking knowledge of Spanish and an interest in anthropology, and on returning to Cornell submitted as his graduation thesis in 1878 a dissertation on the origin of the Indians of Oaxaca and Chiapas.

In 1880 he graduated in medicine at the University of Michigan, and a year later married Miss Charlotte LeBreton Johnson, herself also an M.D. of Michigan who had been assistant to the surgeon at the Women's Prison at Framingham, Massachusetts. After some brief practice in Ohio and New Mexico they settled in San Diego, California, where Dr. Charlotte Baker officiated in over one thousand maternity cases without the loss of a mother.

In those days the population of San Diego was around 2,000, and every resident was acquainted with every other one. The Bakers were known to the community as Dr. Fred and Dr. Charlotte. In later years when the frontier town had developed into a modern metropolis with upwards of a quarter million population, and Dr. Charlotte had served as president of the County Medical Society, the Y. W. C. A., the Women's Civic Center, and

DR. FRED BAKER

the Civil Service Commission, and Dr. Fred as president of the City Council, the Board of Education, the San Diego Biological Association (which later became the Scripps Institution of Oceanography), the San Diego Society of Natural History, the County Medical Society, and had held positions in the San Diego Zoological Society, the Board of Directors of the State Normal School, the Library Board, and both State Medical Societies, they were still known as Dr. Fred and Dr. Charlotte.

In 1911 Dr. Fred was appointed surgeon and malacologist of the Stanford expedition to Brazil, at the close of which he extended his journey to the junction of the Madeira and Mamoré rivers, 1,000 miles up the Amazon. This afforded him the opportunity to collect many kinds of land and freshwater shells from a hitherto unknown part of America, and to make important observations on the ecology of other forms of life. His paper on "Land and Fresh Water Mollusks of the Stanford Expedition to Brazil" was published by the Academy of Natural Sciences of Philadelphia. A report on the marine shells, on which he was working with J. R. LeB. Tomlin, of the British Museum, was incomplete at the time of his death.

In 1914 he collected extensively in the orient for the National Museum, the Academy of Natural Sciences, and the California Academy of Science, and in 1921 the last named institution sent him to the Gulf of California.

The foundation of the Scripps Institution of Oceanography was very largely the result of Dr. Fred's untiring energy, and he was also among the founders of the San Diego Zoological Society, which now maintains the second largest zoo in the country. It is believed that at one time his collection of shells was the largest privately owned collection in the country. In accordance with his wishes it has been given to the San Diego Natural History Society, which institution stands in the way to become the malacological center of the west coast, having already acquired the Orcutt and the Lowe collections. The late Mr. F. W. Kelsey, of San Diego, had collaborated with Dr. Fred in establishing the Baker-Kelsey collection of Pacific Coast mollusca, now at the Scripps Institution at La Jolla, of which Dr. Fred was honorary curator at the time of his death. He was also a life member of the California Acad-

emy of Science and of the Pacific Geographic Society, and belonged to the San Diego Historical Society and the San Diego Museum Association.

Dr. Fred's first contribution to the NAUTILUS was in 1902, an article on a collection at San Martin in Lower California, where he and his family took a summer cruise and holiday. Since then he has contributed several times, and beginning in 1926 was called to the pleasant task of abstracting each number for *Biological Abstracts*. He was particularly proud that he did not miss a number, even during a period of near blindness prior to a successful operation for cataract.

It has been said that Dr. Fred was a pioneer. This is true, but it is not as a pioneer that he will be remembered. Most of those who knew him in the pioneer days were gathered to their reward long before him. Rather will he be remembered by a younger generation, who had the privilege of knowing him in his den, of borrowing his books and consulting his monumental card catalog, whom he inspired with his infectious enthusiasm, and who profited by his generosity with his duplicates. Those fortunate ones will remember him with real affection.

Dr. Fred and Dr. Charlotte died within a few months of each other. They are survived by a daughter, Miss Mollie C. Baker, dean of women at Fresno State College, a son, Captain Robert H. Baker, of Point Loma, and a grandson, Kenneth Baker, who have assisted in the preparation of this notice.

JOSHUA L. BAILY, JR.

THE EIGHTH ANNUAL MEETING OF THE AMERICAN MALACOLOGICAL UNION

Havana, Cuba, August 1 to 6, 1938

BY IMOGENE C. ROBERTSON

Forever memorable in the annals of the American Malacological Union will be its Eighth Annual Meeting, which was held in Havana, Cuba, during the first week of August, 1938. On this occasion the Cuban Government and Dr. Carlos de la Torre, Cuba's most beloved scientist, were hosts in all that the word implies.

Arrangements had been made for members to register with Mrs. Wallace B. Kirke at the Old Island Trading Post in Key West, Florida, on July 31; thus all were in readiness early on Monday, August 1, to board the Cuban Cruiser "Cuba" which had been sent by Colonel Gonzalez, Chief of the Cuban Navy, for the trip to Havana. Commander Casanova and Rodriguez Alonzo were in command of the "Cuba" and officers and crew were tireless in their ministrations to the comfort of their guests.

Dr. Abelardo Moreno, Ernesto Freyre and Carlos Alzuzaray, representing Dr. de la Torre, and Rafael Miguel Zayas, for the Secretary of Education, constituted the welcoming committee as members boarded the boat, making them feel at home from the first moment.

Dr. de la Torre, President of the Union, greeted the fifty-seven visitors as they disembarked on arriving in Havana, where they were driven at once to the convention headquarters in the Royal Palm Hotel. A meeting of the Executive Council of the Union was held later in the evening when the program was arranged and reports of the Check-list Committee and the Committee on Nomenclature were read.

Regular sessions were opened on Tuesday morning in the Academy of Sciences of the University of Havana, Dr. de la Torre as host giving an address of welcome which was responded to by Dr. Paul Bartsch, past President. Knowing Dr. de la Torre intimately from long association in the field and in the laboratory, none could more feelingly express the gratitude and affection of every member present as he thanked our host for his unprecedented hospitality.

Papers read at this session were as follows: "The Cuban Operculate Land Shells of the Subfamily Chondropominae" by Dr. Carlos de la Torre and Dr. Paul Bartsch read by Dr. Bartsch; "The West Indian Operculate Land Shells of the Subfamily Chondropominae, exclusive of Cuba," by Dr. Paul Bartsch; "The Taxonomic Value of the Radula," by Dr. Joshua L. Baily, Jr.; "The Origin of the Bahama Land and Freshwater Mollusk Fauna," by William J. Clench; "Classification of the Polygyridae," by Dr. Henry A. Pilsbry.

At the conclusion of the morning program the visitors were

received by Dr. Fernando Sirgo, Secretary of Education, Dr. de la Torre presenting the guests. Dr. Bartsch spoke briefly in appreciation of the honor extended to the Union on this occasion and paid a tribute to the leaders in science which Cuba has produced. Dr. Sirgo, expressing the pleasure of the city in extending a welcome to the Union, wished them a successful continuance of their work for the glory of science.

The reading of papers was resumed in the afternoon, the first being on "A Collection of Freshwater Shells from Kamchatka," by Walter J. Eyerdam, read by Dr. Bartsch. Mrs. William P. Hume gave a short talk on "Shellcraft," describing what children in Charleston, South Carolina, have done with shells, using their ingenuity to form more or less artistic creations by combining various kinds. Examples of this work were shown at a later meeting. Two reels of film showing "Some New England Nudibranchs" photographed by Henry D. Russell were next shown. Mr. Clench read the explanatory notes which accompanied these moving pictures of some of the most colorful and interesting of mollusks. Another film, "Evolution of the Cuban Liver Fluke and its Intermediate Hosts" followed, the result of careful research by Dr. Perez Vigueras and Dr. Abelardo Moreno, showing the life history of this destructive parasite and the methods of its dispersion.

Other papers of the afternoon were "William Henry Doherty, an Almost Forgotten American Conchologist," by Dr. H. E. Wheeler, and "Physiology of Reproduction of *Ostrea virginica*" by Dr. Paul S. Galtsoff, the latter having an important bearing on the possibility of introducing a new industry in Cuba, that of oyster culture.

Papers presented on Wednesday were: "On the Probable Cause of Certain Variations in the Color of the Shell in the Genus *Liguus*" by Dr. Ricardo de la Torre; "The Genus *Semicassis* in the West Indies" by Dr. Harald A. Rehder; "On the Description of Mollusks" by Dr. Gulielmo Aguayo; "Why a Cuban Aquarium Should Excel All Others" by Fred Orsinger; "Malacology versus Conchology in the Family Amnicolidae" by Dr. Elmer G. Berry; "The General Relations between the Naiades of the Cahaba and Tennessee Drainage" by Dr. Henry van der Schalie, read by Dr.

Berry in the absence of the author; "Structure of the Radula" by Dr. Henry A. Pilsbry; "The Distribution of Land Mollusks of Alabama from their Probable Center of Origin" by Dr. Allan F. Archer, read by Dr. Wheeler; "Anatomic Studies of the Genus Polymita" by Dr. Abelardo Moreno; "Description of a Mollusk Trap devised by Frank B. Lyman" by Mrs. M. P. Van Woert.

The paper by Dr. Aguayo concluded with the resolution, seconded by Dr. Ricardo de la Torre, that no description of a mollusk will be considered valid without figures as well as descriptive data and locality.

Mr. Orsinger's arguments for an Aquarium for Cuba were irrefutable. Every facility has been supplied by nature to make the maintenance of such an aquarium almost negligible when compared with the high cost of similar institutions in other countries.

At the close of the program of papers, officers were elected for 1938–39 as follows: Mr. Maxwell Smith, President; Dr. Horace B. Baker, Vice-president; Mr. Norman W. Lermond, Corresponding Secretary; Mrs. Harold R. Robertson, Financial Secretary. Councillors-at-large: Dr. Henry van der Schalie and Dr. Myra Keen. Honorary and Past Presidents; Mrs. Ida S. Oldroyd; Dr. Henry A. Pilsbry; Dr. Paul Bartsch; Mr. William J. Clench; Mr. Calvin Goodrich; Dr. Joshua L. Baily, Jr.; Dr. Carlos de la Torre.

To the Checklist Committee were added the names of Henry D. Russell, Harold Heath and Frank M. McFarland, filling the vacancies caused by the deaths of Prof. Junius Henderson and Dr. Fred Baker. Dr. Harald A. Rehder was added to the Committee on Nomenclature.

Dr. Pilsbry spoke feelingly of the passing of the two honored and beloved members of the Council, referring to the great work which both Prof. Henderson and Dr. Baker had done for the cause of malacology. Dr. Phil Spicer paid tribute to his close friend, Dr. Fred Baker, of whom Dr. Bartsch also spoke in terms of affection, asking for a moment of silence in memory of each of these great men.

The outstanding event of Thursday's program was a visit to the Instituto Civico Militar at Ceiba del Agua, where orphans of

laborers and soldiers who have died in the service of Cuba are trained in physical, educational and manual training pursuits.

Here the visitors were welcomed by Dr. Sosa who explained the ideals of the institution, after which the buildings were inspected. These include shops and school rooms of the most modern type, and the Museo Carlos de la Torre, where were viewed some of the most beautiful of the Torre collection of Polymitas and Liguus. A review of the nearly 600 children in physical exercises was a thrilling sight, especially when it was realized that the school has been in operation for less than six months. A luncheon in the spacious and well-appointed dining hall of the Institute concluded the visit. At the close of the repast Dr. Wheeler gave a few well-chosen words of appreciation for the splendid work which is being done here under the inspiration of Colonel Fulgencio Batista, Chief of the Army, who plans to place a similar institution in each of the other provinces of the Republic.

The afternoon was devoted to a trip by bus to some of the noted collecting grounds of Western Cuba. A start was made for Viñales but because of transportation difficulties it became necessary to terminate the trip at Candelaria. Returning to the hills near Artemisia many interesting forms peculiar to Cuba were gathered by the enthusiastic collectors.

On Friday afternoon, members visited the University of Havana where they were received by the Vice Rector and Acting President, Dr. R. Mendes Penate. In welcoming them to the University, Dr. Penate assured his hearers of the great respect and admiration which Cuba feels for the scientists of the United States. A tour of the buildings followed, not the least interesting to the group being the room in Museo Poey where Dr. de la Torre carries on his researches surrounded by his corps of devoted assistants.

A banquet given by the management of the Royal Palm Hotel concluded the formal entertainment of this never-to-be-forgotten sojourn in Havana.

A touching mark of affection by our host and retiring President was the presentation to each visitor of an autographed photograph of himself. This photograph, so true to life, is beautifully described in the following lines written by William P. Hume and

dedicated to Dr. de la Torre by Mrs. Hume, who presented them on this occasion:

Laugh Lines

I love the little laugh lines in your face;
The tiny twisted etchings near your eyes:
Dear ghosts of all the happy thoughts and smiles
You gave to others with your laughing grace.
I love the way that time has deftly sketched
So many kindly deeds of hand and heart;
And gently, with a cunning tool has etched
A lovely pattern with a master's art.
I love the little laugh lines in your face,
The lovely pattern of your hand and heart.

A testimonial of gratitude inscribed with the name of every guest was then presented to Dr. de la Torre:

"To Don Carlos:
We are grateful to the Sea
For it gave us the Pearl of the Antilles,
We are grateful to Cuba
For its gift of Don Carlos
Whose teachings have made known
The life of land and sea,
But above all
What friendships should be!"

The following Resolutions were passed:

At the conclusion of this Eighth Annual Convention in Havana, Cuba, the members of the American Malacological Union wish gratefully to express their appreciation of the magnificent hospitality which has been extended to them throughout their stay by the Government and scientific bodies of Cuba.

Nothing has been left undone which could contribute to the pleasure and success of this convention, making it notable in the history of our organization.

Our thanks are especially due to the Honorable Laredo Bru, President of the Republic; to Colonel Gonzalez, Chief of the Navy; to Colonel Batista, Chief of the Army; to Dr. Fernando Sirgo, Secretary of Education; to Dr. R. Mendes Penate, Vice Rector of the University of Havana; to Commander Casanova and Commander Rodriguez Alonzo, of the

Cruiser *Cuba;* to Mr. Moran, Manager of the Royal Palm Hotel; to the press of Havana; and last but not least, to our beloved President, Dr. Carlos de la Torre, and his able aide, Dr. Abelardo Moreno, who have been tireless in securing the comfort and happiness of their guests.

May we also venture to express the hope that the governing authorities of Cuba may realize the value to science and education of an Aquarium and Marine Biological Laboratory which can utilize the unique opportunities available in the environs of Havana.

Saturday, August 6, saw final farewells to our Cuban hosts and the return of the delegates to Key West, the same thoughtful officers and crew in attendance on the "Cuba."

Dr. Abelardo Moreno, Dr. Ricardo de la Torre and Mr. Emerito Vigil accompanied their guests to Key West, where all dispersed to return to the far corners of the country from whence they had gathered for this Eighth Annual Meeting, each carrying back memories of a stimulating six days and a hospitality unsurpassed.

NOTES AND NEWS

CHIEF JUSTICE F. R. LATCHFORD, "the grand old man of Canadian Conchology," died at his home in Toronto, August thirteenth. A notice of his life and work will follow.

HYDATINA PHYSIS (L) IN LAKE WORTH, FLORIDA.—Supplementing notes in THE NAUTILUS, Vol. 52, No. 1, we desire to report that in April, 1938, living specimens were again found. These seemed to be staying within a small area, not migrating, and were mostly female and depositing their egg masses in mud and grass-covered sandy bottom. Early in May some few were taken. Finally in late May those taken were very close to the deepest parts of South Lake Worth, indicating that they probably came out of the deep water in the Spring mating season and returned when the eggs were deposited.—FRANK B. LYMAN, Lantana, Fla.

THE NAUTILUS

Vol. 52 January, 1939 No. 3

SMALL CASSIDIDAE OF FLORIDA AND THE WEST INDIES

BY H. A. PILSBRY AND TOM L. McGINTY

Our small and relatively light species of Cassididae, not humped on the back or with an extended callus over the face, the columellar lip granulose and standing free, belong to the genus *Semicassis*. Dead shells are not uncommon on Florida and Texas beaches, but living specimens are harder to come by, as they burrow in the sand with only a small part of the shell exposed. As several names appear to be in use for our common species, the authors spent some time in going over the early literature, with the following results.

An astonishing number of names were proposed for these small *Cassis*, most during the XVIII century, and by authors such as Gmelin and Röding, who merely named figures in the still older iconographies, or by others who had real shells, but depended on the old works for figures. Tryon in the Manual of Conchology lumped the Mediterranean, West Indian and West American forms under *Cassis sulcosa* Brug., with var. *inflata* Shaw and var. *abbreviata* Lam.; but his synonymy was confused and the references to figures misleading.

Finally, it has to be admitted that although the great majority of shells can easily be referred to one or another of the forms named below, there seem to be also some transitional forms which refuse to be rigidly classified. Our object here is to point out the proper names for the several prevalent forms, whatever their status.

A west Mexican species of this group is SEMICASSIS CENTIQUADRATA Valenciennes, which was figured by Reeve as a form of *Cassis abbreviata* Lam., a very different thing.

SEMICASSIS GIBBA (Gmelin). Plate 5, figs. 1, 2, 3.

Buccinum gibbum Gmelin, 1791, Systema Naturae (13), p. 3476.
Cassis sulcosa and *Cassis inflata* of some authors.
Cassis malum, C. cepa and *C. globulus*[1] Röding, 1798, Mus. Boltenianum p. 31.

The oval shell with rather acuminate spire is shell pink to nearly white, with six series of squarish cinnamon spots, those at suture and extreme base often smaller, irregular or weak. It is deeply grooved spirally, the moderately convex or sometimes nearly flat raised cords being very much wider than the grooves, 17 to 19 on the last whorl, the second one from the suture generally narrow. The upper four or five cords generally are crossed by narrow tubercles, but these may be weak or practically absent. In large numbers seen from many localities, a few have a varix preceding that at the lip by about a whorl, more or less.

Large specimens (from Beaufort, N. C., and Lake Worth, Fla.) run from 75 to 80 mm. long. The common size is 60 to 65 mm., small ones down to 35 to 40 mm.

Specimens seen are distributed from Beaufort, N. C., along the Atlantic and Gulf coasts to Tabasco, Mexico. We have not seen it from the northern coast of the Gulf in Alabama, Mississippi and Louisiana, but this may be due to insufficient collections from those states. A series from St. Thomas is in the Swift collection.

SEMICASSIS GIBBA ABBREVIATA Lamarck. Plate 5, fig. 4.

Cassis abbreviata Lamarck, 1822, Anim. sans Vert. 7: 224.

This shell is similar to *S. gibba* but always small, length about 33 to 44 mm., very solid, nearly white with faint spots or none, with narrow axial folds crossing the spirals throughout. There is frequently a strong varix on the front of the last whorl.

A specimen from Varadero Park, on the north coast of Cuba, is figured. It occurs also on Boynton Beach and probably on the Keys, Florida. A rather dubious "subspecies," being based on size and solidity.

---

[1] *Cassis globulus* was based upon Lister's plate 999: 64 (to which we now restrict it; this is the type figure of *B. gibbum* Gmel.), and also figures in Martini which are either small *C. gibba* or *abbreviata*, but not sufficiently characteristic for certain identification.

SEMICASSIS GIBBA INFLATA (Shaw).

Buccinum inflatum Shaw, 1811, Naturalists Miscellany, 22, pl. 959. (Figure reversed by engraver.)

Cassis inflata Shaw, Reeve, Conch. Icon. pl. 9, f. 22*c* (only).

Cassis tessellata Pfeiffer, 1840, Krit. Register zu Martini u. Chemnitz's Syst. Konchyl.-Kab. p. viii.

This capacious shell is the largest West Indian *Semicassis.* Shaw's figure said to be natural size, is about 108 mm. long. The largest we possess is 99 mm. It varies from oval to subglobose, the diameter from 63 to 77 per cent of the length. The spiral sulcation is weak on the convexity of the last whorl, but strong above and below it. There is no trace of a corona of tubercles at the shoulder. Occasionally there is a varix near the beginning of the last whorl or on its left side. We have not seen specimens transitional to *gibba.*

Specimens are in the collection of the Academy from St. Thomas, Tortola and Barbados, but none have been seen from Florida.

SEMICASSIS CICATRICOSA (Meuschen). Pl. 5, fig. 6.

Buccinum cicatricosum Meuschen, 1781, in Zoophylacium Gronovianum, Tabl. Explic. p. v, pl. 19, f. 1, 2.

Cassis laevigata Menke, 1830, Synopsis Meth. Moll., p. 144, (Barbados), may well be considered a synonym of *S. cicatricosa* unless the type shows it to differ. Not figured.

Buccinum recurvirostrum Gmelin, 1791, p. 3477, based solely on Lister, 1016: 75, (Barbados), appears to be a synonym of *S. cicatricosa.* Reeve has used the name *Cassis recurvirostrum* Wood for an Australian species.

With about the shape of *S. gibba,* this shell differs by the nearly smooth surface. There are very weakly raised narrow spirals, fewer than the spirals of *gibba,* with wide, flat, "malleate" intervals on the last whorl; merely engraved lines on the spire.

The figured specimen is one picked up on the beach at Georgetown, Grand Cayman Island. Occurs also on Guana Key, Aabaco group, Bahamas. We do not know that it has been found in Florida, but it is to be expected there. The name *cicatricosa* refers to the scarlike impressions of the surface.

Semicassis cicatricosa peristephes, new subspecies. Pl. 5, fig. 5.

With the general proportions of *S. gibba,* this shell has a shoulder bearing pointed tubercles, of which about 16 can be counted on the last whorl. It appears also on the back of the penult whorl. The flat upper face of the later whorls has four granulous cords. A short distance below the shoulder the glossy surface shows extremely weak hardly raised spirals equal to their shallow intervals, or near the base about four spiral grooves separated by flat intervals. There is also some irregular axial wrinkling or folding of the surface over the middle and anterior parts. The coloration resembles that of *S. cicatricosa:* on a pale cinnamon-pink group there are irregular large and small cinnamon (darker or lighter) spots below the suture, some small spots along the shoulder, and three spiral series of small squarish or sometimes twinned spots on the middle and forward. There are also the usual dark spots behind the recurved lip weakly continued on the outer callus. Aperture about as in *S. gibba;* 20 ridges within the outer lip.

Length 44.6 mm., diam. 31 mm. Lake Worth, Florida. Type.
Length 38 mm., diam. 26 mm. Varadero Park, Cuba.
Length 36 mm., diam. 25 mm. St. Kitts, B. W. I.

Sand bar of Peanut Island, northern inlet of Lake Worth, together with *S. gibba.* Type 173344 ANSP., collected by Thomas L. McGinty.

It is a beautiful shell, rare in Lake Worth, and apparently found throughout the West Indies. It occurs on Guana Key, Abaco group. In a series from St. Thomas there is one shell transitional to *S. cicatricosa.* (*Peristephes,* crowned.)

There remain a number of ancient names for forms of the *S. gibba* group, based upon figures in Lister, Knorr, Chemnitz and others, which have been variously identified by different authors. No general agreement on these is to be expected, as one guess at such enigmatic figures is about as good as another. The names had better be dropped.

Buccinum granulatum Born, 1780, Test. Mus. Caes. Vindob. p. 248, was not figured, but in the synonymy Born cites the figure of an Amboina shell in Rumphius, and two quite different figures in Chemnitz[2] perhaps representing a West Indian shell. Born's description reminds one of *S. inflata* Shaw, as he says it is transversely obsoletely sulcate; but it seems impossible to tell just what

[2] Küster referred Chemnitz's figures to *Cassis inflata* Shaw.

he described unless his type can be found in Vienna. He gave the localities Mediterranean Sea and Amboina.

Buccinum bilineatum Gmelin, 1791, was based upon an unlocalized figure in Lister, which has some resemblance to our *peristephes,* but it is not possible to tell whether the markings at shoulder are knobs or color spots, the bilineate pattern is unlike any *peristephes* seen, and spiral sulcation is represented as distinct throughout. It does not seem sufficiently definite for consideration.

Buccinum trifasciatum Gmelin, 1791, refers to a rough, foreshortened engraving of some form of the *S. gibba* group. It had better be given up as inadequately defined.

Buccinum undulatum Gmelin, 1791, rests upon Lister's 996: 61, labeled Barbados. It is a large form which can hardly be anything else than *inflata* Shaw; yet the figure is so poor that it does not seem wise to adopt the name in place of *inflata,* especially as some authors have used the name *C. undulata* for the Mediterranean shell. See Buquoy and Dautzenberg, 1882, Moll. Mar. Roussillon 1: 66, pl. 7, f. 3, 4.

Cassidea sulcosa Bruguière, 1792, probably comprised the preceding as well as some other forms. It has often been used for *S. gibba,* but besides some doubt as to exactly what Bruguière had, the name is later than *gibba.*

Buccinum testudo Solander, of the Portland Catalogue, 1786, which Dall marked "+*Cassis sulcosa*" (Nautilus 34: 98), was based on figures of a very different *Dolium* (*Tonna*), not a *Cassis.* We do not know what Dall intended by the plus sign.

NOTE ON THE TYPE OF *HELIX (HELICOGENA) GILVUS* FÉRUSSAC

BY DR. CARLOS DE LA TORRE

University of Habana

In July, 1925, I had opportunity to study the type specimen of *Helix gilvus* Fér.[1] in the collection of Férussac types in the Museum d'Histoire Naturelle, au Jardin des Plantes, in Paris. Through the courtesy of the Museum authorities I was able to examine this type carefully. It is a unique specimen, perfectly preserved, on its original tablet. As soon as I saw it I realized

[1] *Helix* (*Helicogena*) *gilvus* Férussac, 1821, Tabl. Syst. Fam. Limaçons p. 29, No. 36 (no description or locality). Hist. Nat. Moll. Terr., Fluv., pl. 21 B, f. 1; Expl. Pl. Suppl. 1822, p. ii.

that D'Orbigny had committed an error when he applied the name *H. gilva* Fér.[2] to our Cuban *Cepolis* from Trinidad and Jagua (an ancient name for Cienfuegos). Our species has the same size and general appearance, but it differs by the weakness or absence of pink coloring or stain on the columella, as well as some other characters, such as the details of banding, the apex or embryonic shell, and the interior of the aperture.

H. gilvus Fér. has a continuous dark chestnut peripheral line, and another, also continuous, subsutural line; the rest of the bands (four at the base and two or three above), are lighter colored, ferruginous, and interrupted, like species of the group of *Cepolis varians, C. troscheli, C. multifasciata* and others. The apex has a corneous, somewhat purplish tint under the lens, and the interior of the shell is also somewhat violaceous pinkish. The surface has a distinctly ribbed sculpture.

Upon observing these characters I was convinced that Férussac's *H. gilvus* is not the Cuban species and that it must be one of the Bahaman group. On looking over the Bahaman species with Dr. Pilsbry, I conclude that it is in all probability identical with *Helix milleri* Pfr., which agrees with Férussac's type better than *H. multifasciata* Weinl.

The Cuban *Helix gilva* Orb. (nec Férussac) must receive another name, and I propose to call it Cepolis pseudogilva. The name *H. corrugata* Pfr., 1841, cannot be used on account of the prior *Helix corrugata* Gmelin, 1791. The name *H. pallida* Rang MS., in Arango, from "S. Yago de Cuba" (Rang), is equal to *H. fuscolabiata* Poey.

[2] *Helix gilva* Fér., Orbigny, 1841, Hist. Phys., Polit., Nat. de l'Ile de Cuba, 1: 157, pl. 8, f. 9, 10, 11. D'Orbigny's figures are about 1½ times natural size. His type was the maximum size, 17 mm. diam.; it is more often about 15 mm. The hill "La Vigia" at Trinidad may be accepted as type locality. His figures are good for a common pattern found there.

SPHAERIIDS FROM THE ALEUTIAN ISLANDS

BY NILS HJ. ODHNER
Stockholm, Sweden

With one text-figure and Plate 6

From Mr. W. J. Eyerdam, Seattle, I received for identification a small collection of Sphaeriids that he had brought back from the Aleutian Islands, a district, from where, as far as I know, no identified species of these small freshwater mussels has been recorded. That the genus *Pisidium* is represented in those islands, is, however, a known fact, since Dall (1897) stated the occurrence of *Pisidium* "on many of the Aleutians," but no definite species seems to have been mentioned in the literature. One of the species in Mr. Eyerdam's collection is named by Sterki after the collector, but I cannot find any literary reference to this species, so it seems to be undescribed, and, besides, it proves to belong to a species already known. Though small, the present collection therefore offers a faunistic interest, the more so, as it confronts us with the question about identical species in the Eurasian and the American faunas. The material collected consists exclusively of dried specimens, which is regrettable, since an examination of the soft parts is in many cases the only means of getting a sure determination of the species of Pisidia. Only five species have been discriminated.

Sphaerium nitidum Clessin. Unimak Island, False Pass, in a lake (Aug. 1932), several sps., max. length 6.5 mm.; Amlia Island, in a lake (July 1932), numerous sps., max. length about 8 mm. The species is easily recognized in its very fine and regular costulation of the umbonal region (fig. 6), a character not met with in any other species of *Sphaerium*. The Eurasian *Sphaerium corneum* has smooth umbones and attains a larger size. The two species are different also in the soft parts, *e.g.*, the proportions of gills and the shape of nephridium, as I have shown in 1929 (*l.c.*, figs. 16–18).

The presence in the Aleutians of *Sph. nitidum*, originally described from western Siberia, is rather surprising, since no reports of its occurrence in the eastern parts of Siberia are available. This depends, no doubt, on the relative scarcity of

collecting work in those regions and on lack of acquaintance with the species and its characters. These are, however, described by me in a brief account of its habitus and distribution in 1921 (*cf.* Literature), when first I recorded it as a Scandi-

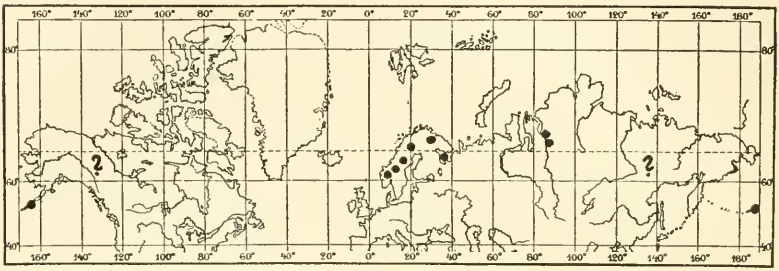


Fig. 1. Distribution of *Sphaerium nitidum* Clessin.

navian inhabitant, and in 1929. The map, text figure 1, shows its distribution as hitherto known. It was originally described in Westerlund's work (1877) on the Siberian mollusca (in Swedish), where it was reported from two localities on the lower Jenissei: Lusino, 68° 40′ N., and Dudino, 69° 15′ N. In 1937, I gave a summary of its distribution in N. Russia (it occurs probably in the Solowetski Islands) and Finland, as well as in the Scandinavian Peninsula, from North Sweden south to Härjedalen, and from Northern Norway south to Gjövik; generally, it is met with next to the highest regions of the peninsula.

The Scandinavian distribution of *Sph. nitidum* leads one to suppose that its immigration has taken place in postglacigene time from the northeastern parts of Europe, and that, on account of its route being across the course of the rivers, it has been dispersed by means of waterfowl. The isolated occurrences on the two Aleutian islands seems to be explainable only by the same assumption, in which case it certainly has had, or still has, a foothold on the continental coasts, like the *Pisidium* species below.

PISIDIUM CINEREUM Alder (=*casertanum* Poli). Akatan Island, NE. of whaling station, in a pond (June 1934, I. Norberg), a few sps., max. length 4 mm.; the same island, in a small lake (Aug. 1934, I. Norberg), a few sps., max. length 4.6 mm.;

besides, the same species is taken on Kodiak Island, Three Saints Bay, in a pond (Aug. 1931, Eyerdam) and sent me as paratypes under the name of *P. eyerdami* Sterki (max. length 4 mm.), and from Cordova, Alaska, in a creek (May 1936, I. Norberg), a few sps., max. length 3.7 mm. Considering the great variability of this species, it may be remarked that it offers some slight modifications of shape in different localities, even in the same island (Akatan); the lake form (fig. 1) differs here from the pond form in its pale straw yellow color, its somewhat more posterior umbones and its straighter cardinals, and it is very similar to *P. subtruncatum*, though less oblique; the animal, however, has the characters of *P. cinereum* in its well separated mantle margins. The pond form, on the other hand, has the same grayish color and the more median umbones as in the Alaskan specimens (from Cordova and Kodiak, fig. 3), though these in their turn have less prominent umbones and a greater height of shell. These slight differences in shape cannot be considered as of specific importance the more so, as the animal in all cases has the characters of *P. cinereum*, as far as could be established on the dried material, and for these reasons I cannot accept *P. eyerdami* as a distinct species.

I have compared the present forms of *P. cinereum* with the Pisidia described by Westerlund (1877) from Siberia and Alaska, and I have found the Akatan lake form to agree closely with specimens from Port Clarence determined by Westerlund as *P. sibiricum* Clessin (collected by the Vega Expedition the 23rd–26th of July 1879). The Kodiak form is more like *P. boreale* from Siberia in its depressed umbones. These two "species" were listed all right as synonyms of *P. cinereum* by Woodward (1913), and the same was the case with *P. nordenskjöldi*. As to the Akatan pond form, this is most similar to a form of *P. cinereum* that I got from Mr. Eyerdam from Kamtchatka (gulf of Kronotski, in a small stream, coll. July 1925) and that has been identified by Sterki as *P. roseum* Scholtz (which is likewise identical with *P. cinereum*).

In this connection it may be mentioned that among the *P. sibiricum* (stored in the Swedish Riksmuseum and determined by Westerlund) from Port Clarence (Vega Exp.) were a good

many specimens of *P. obtusale* Pfeiffer (= *obtusalastrum* Woodward), which had not been discriminated by Westerlund. This species (fig. 2), hitherto not recorded from N. America, thus proves to belong to the American Arctic fauna. The specimens are similar to the general boreal form (*e.g.,* from Sweden) and have a similar ovoid (not oblique) shape, and short, almost straight inner cardinal in the left valve; the largest specimen is 3.2 mm. in length.

Pisidium lilljeborgi Clessin (fig. 4). Woodward (1913) includes in his list of synonyms of *P. cinereum,* with a query, *P. arcticum* Westerlund, from Port Clarence. This species, the type of which is in the Swedish Riksmuseum, has proved, on my examination, to be identical with *P. lilljeborgi* Clessin, inasmuch as shape and denticulation are similar. *P. arcticum* has the same oblique prolongation towards front and below as typical specimens of *P. lillejeborgi.* With the present species I think we have to unite also *P. scutellatum* which Sterki described in 1896 from Like Michigan (relatively deep water) and which he reports from the Pribilof Islands in 1917. Judging from the illustrations by Baker (1902, pl. XXXI, fig. 14), shape and dentition are in good agreement in both forms, and *P. scutellatum* has a distribution in America (lakes and high mountains, from "Vermont, the Great Lakes region, west to Colorado and north as far as the Yukon Territory," Mozley 1931), which corresponds well to its distribution in Europe and Asia (to the vicinity of Lake Baical, Mozley 1935).

P. lilljeborgi is present in the Eyerdam collection, too, namely from Unimak Island, False Pass, together with *Sph. nitidum,* a few sps., max. length 3.8 mm. It differs, however, from the typical form in being less oblique, the frontal margin being more curved, and the whole outline thus well rounded (fig. 4). On account of its thinner shell, the present form has its hinge plate very narrow and its cardinals almost straight and more elongate than in *P. obtusale*; the ligament fossule is also long and narrow in comparison with that of the latter species from P. Clarence. A similar rounded form of *P. lilljeborgi* has been figured by Woodward (1913, pl. 28, figs. 13, 17, 22).

Pisidium milium Held. Only one specimen of this species was

found in Akatan Island, together with *P. cinereum* (Aug. 1934, I. Norberg), 2.4 mm. in length. It differs somewhat (fig. 5) from Scandinavian specimens in its front being more rounded instead of obliquely protruding below. The dentition, however, proves the identity, and the mantle margins, as far as could be ascertained from the dried animal, were coalesced, quite as in the type, for some length in front of the branchial opening. *P. milium* is not an unexpected inhabitant of the Aleutians, because it has a wide distribution not only in the Palaearctic region, but according to Sterki (1926) also in North America "from New England and New York to Ontario, Michigan, Manitoba, to western Washington, also in the Rocky Mountains of Colorado, at high altitudes."

Pisidium conventus Clessin. To this species I refer a very small specimen (length 1.7 mm.) from Unimak Island, False Pass, found together with *P. lilljeborgi*. Though it is very difficult to examine *Pisidia* of small size and especially young ones, I do not hesitate to identify the present empty shell with this well characterized Arctic species, on account of its shape, dentition and microscopic sculpture. Consequently, also this Arctic species belongs to the American fauna, though it still remains to be detected on the American continent. It seems to be the most hardy mollusc in the Arctic region, as it has been found living on such extreme latitudes as in Novaya Zemlya, and it has a distribution from N. Scandinavia southwards to the Alpine lakes, where it was described by Clessin in 1877, who later on discriminated a lot of "species" inhabiting each its own deep lake, most of them, however, mere modifications of *P. conventus,* as I have shown in 1923. Later *P. conventus* was found in Great Britain, Finland and Siberia (Lake Teletsk). It is the type of the subgenus *Neopisidium* characterized in having only a single gill on each side, a single mantle siphon and a simple nephridium. For further information I refer to my paper of 1937 (see below).

Literature

Baker, F. C., The Mollusca of the Chicago Area. The Gastropoda. The Chicago Acad. of Sci. Bull. III, pt. II, 1902.

Dall, W. H., The Mollusk Fauna of the Pribilof Islands. The Fur Seals and Fur Seal Islands of the N. Pacific Ocean, pt. III, 1899.

MOZLEY, A., Reports of the Jasper Park Lakes Investigations, 1925–26. The Mollusca of Jasper Park. Trans. Roy. Soc. Edinburgh, 56, 1931.

The Fresh Water and Terrestrial Mollusca of Northern Asia. *Ibid.*, 58, 1935.

ODHNER, N. HJ., Sphaerium nitidum, a Siberian Freshwater Mussel, in Sweden. Proc. Malac. Soc., 14, 4. 1921.

Die Molluskenfauna des Tåkern. Sjön Tåkerns Fauna och Flora utg. av K. Sv. Vet.-Akad. Stockholm 1929.

Einige in Finnland neu gefundene Süsswassermollusken. Acta Soc. pro Fauna et Flora Fennica, 60, 1937.

STERKI, V., Two New Pisidia. The Nautilus 9, 1896.

A new Mollusc of the Genus Pisidium from Alaska with Field Notes by G. Dallas Hanna. Proc. U. S. Nat. Mus. 51, 1917.

Sphaeriidae, palaearctic and nearctic. The Nautilus 40, 1926.

WESTERLUND, C. A., Sibiriens Land-Och Sötvatten-Mollusker. K. Sv. Vet.-Akad. Handl. 14, Stockholm 1877.

WOODWARD, B. V., Catalogue of the British Species of Pisidium. London 1913.

A TRIAD OF UMBILICATE *LATIRUS*, RECENT AND PLIOCENE

BY H. A. PILSBRY

Two large and peculiar species of *Latirus* are among the recent discoveries of Messrs. Tom McGinty and Maxwell Smith in southern Florida. A third related species from St. Thomas is described in this connection.

LATIRUS MCGINTYI, new species. Pl. 5, fig. 8.

The shell is strong and solid, openly umbilicate, fusiform, the spire tapering rather slowly (the early whorls lost in the type); the periphery (measured in front) about midway of the length; anterior part of the last whorl cylindric, terminating in a narrow siphonal fasicole around a large, funnel-shaped umbilicus. Suture not deeply impressed. Sculpture of heavy rounded axial folds at the periphery and downward to the basal contraction, eight on each of the later whorls. These are crossed by about five spiral cords, more prominent in the intervals of the folds, the lower two being contiguous and forming a weak angulation next to the basal concavity; there are also several low, unequal spirals on the

cylindric anterior part. Between the cords there are several unequal spiral threads; these extend also over the foldless concave zone between periphery and suture. The irregularly racquet-shaped aperture has about nine lirae in the throat and two oblique folds on the columella, a barely perceptible third fold below them. Anterior end of the siphon is recurved. The shell is cream colored, with traces of tawny-olive periostracum where unworn. The aperture is shell pink within, deepening to coral pink in the throat.

Length 69.5 mm., diam. 31 mm.; length of aperture 36.5 mm.; about 6 whorls remaining.

Lake Worth, Palm Beach Co., Florida, collected by Tom McGinty, for whom it is named.

Latirus recurvirostrum (*Turbinella recurvirostra* Schubert & Wagner, 1829, Neues Syst. Conchylien-Cabinet 12: 100, pl. 227, f. 4021 *a, b*) is a peculiar species of this group, much more lengthened and slender anteriorly than *L. mcgintyi*. Reeve reported it from Luzon on Cuming's authority. His figure, copied by Tryon, does not seem typical for Schubert & Wagner's species. I have not seen it.

LATIRUS TROCHLEARIS (Kobelt). Plate 5, fig. 7.

The shell is similar to *L. mcgintyi* in general form but is broader with a shorter spire; the periphery (in front view) is above the middle of the length; the axial folds are higher, nearly nine to a whorl. The spiral cords are stronger, the pair above the basal contraction being heavy and prominent. Interstitial spiral threads are unequal. The cream colored shell is covered with a rather thin tawny-olive periostracum. Above the last two whorls there are liver-brown spots in the intercostal intervals. The aperture is buff within with rather weak lirae in the throat and five columellar folds, three being well developed, the upper and lower very small.

Length 65.5 mm., diam. 35 mm.; length of aperture 33 mm.; 8 whorls, the apex lost.

A young shell shows a slightly bulbous nucleus of $1\frac{2}{3}$ smooth whorls, the first whorl strongly convex, then becoming flat, an axially low-ribbed stage of about a third of a turn following, then the sculpture of the adult stage begins.

Originally described from St. Jan; the specimen figured is from St. Thomas, West Indies, 34983 ANSP., collected by Robert Swift.

This is the West Indian shell which Tryon (Man. Conch. 3: 89) identified as *Latirus maderensis* (Watson). That Madeiran

species (described as *Chascax maderensis* Watson, Proc. Zool. Soc. Lond. 1873, p. 362, pl. 36, f. 30) differs in many details of sculpture and form. It has an even larger umbilicus, and is undoubtedly distinct from the West Indian species. The specimen figured is larger than Kobelt's type of *"Turbinella" trochlearis,* Syst. Conchyl.-Cab., *Turbinella,* p. 79, pl. 19, f. 1, 2. 1876.

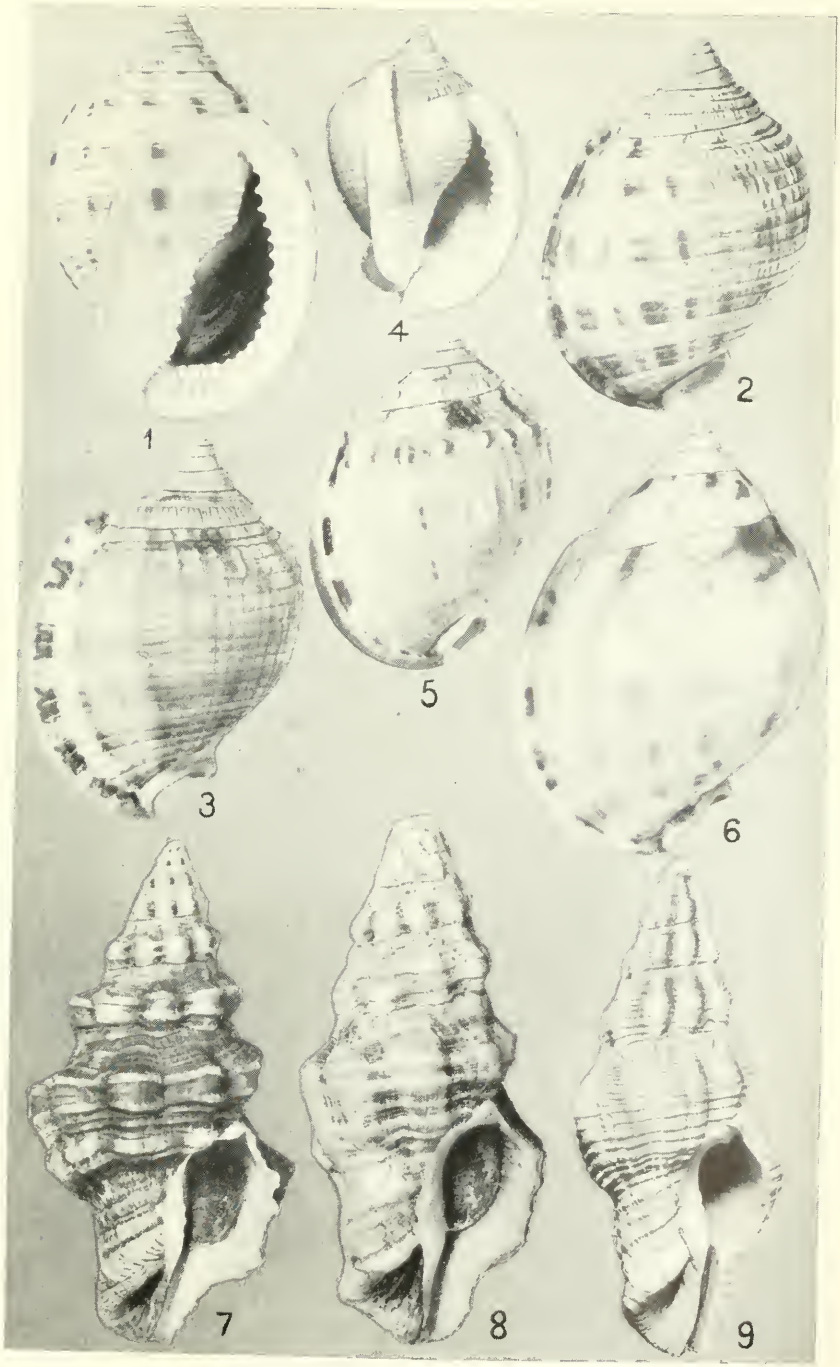
Latirus maxwelli, new species. Pl. 5, fig. 9.

The shell is solid, openly umbilicate, fusiform, the spire tapering regularly, the periphery (viewed in front) being a little above the middle of the length. Anteriorly it is somewhat cylindric and terminates bluntly, with a prominent, rounded siphonal fasciole around the deep umbilicus. Sculpture of moderately prominent axial folds (nearly nine on each whorl), weak near the suture and vanishing at the basal contraction of the last whorl. Over all a sharply developed sculpture of strong spiral cords alternating with threads except in the subsutural zone, where the cords are smaller and subequal. On the cylindroid anterior part there are about four somewhat larger cords with interstitial threads. The racquet-shaped aperture is strongly lirate within, the lirae about 12, arranged in pairs, the lower pair short, hardly entering. There is a strong ridge on the parietal wall near the posterior angle of aperture, and four columellar folds, the lowest one short, not entering.

Length 64 mm., diam. 27.3 mm.; length aperture 33.5 mm.; about $6\frac{1}{2}$ whorls remaining.

Ortona Locks, De Soto Co., Florida. Caloosahatchee Pliocene. Type 13534 ANSP., collected by Maxwell Smith, for whom it is named.

This beautiful fossil is quite unlike anything known from the Caloosahatchee beds. It is most nearly related to the living *Latirus trochlearis* and *L. mcgintyi,* but differs conspicuously by the profuse development of spiral sculpture and the weaker axial folds.



1–3, Semicassis gibba, Lake Worth. 4, S. gibba abbreviata. 5, S. cicatricosa peristephes. 6, S. cicatricosa. 7, Latirus cochlearis. 8, L. mcgintyi. 9, L. maxwelli.

NOTES ON THE GENERA *POTAMOPYRGUS* AND *LYRODES*

BY J. P. E. MORRISON[1]

The genus *Potamopyrgus* was created by Stimpson in 1865[2] for *Melania corolla* Gould, of New Zealand. *Huttonia* Johnson 1891,[3] with the same type species, is necessarily an absolute synonym. The "spines" present on these shells are solely epidermal fringes. The animals of dried specimens (U.S.N.M. Cat. No. 126677) of another member of this group, *P. antipodarum* Gray, were examined after softening in water. The verge of *antipodarum* is long, geniculate, and simple; its shape is that of a long narrow U; the distal half folded forward dextrally along the proximal half. The eyes are on prominent tubercles, as stated by Stimpson in the original description of the genus. This species is oviparous; presumably the other New Zealand forms reproduce likewise.

In 1865 Stimpson regarded the American forms as distinct and designated *P. auberiana* D'Orb., as type of the genus Paludestrina D'Orb., in the mistaken belief that the description in Sagra's Cuba[4] represented its earliest publication.

Lyrodes Doering 1884,[5] with *L. guaraniticus* as type, is the earliest valid name available. *Pyrgophorus* Ancey 1888,[6] with *Pyrgulopsis spinosa* C. & P. as type, is probably completely synonymous. The "spines," when present, are filled by shell material, in the shape of laminiform tubercles. Examination of dried specimens of three forms of this group: *crystallina* Pfr. from St. Croix (U.S.N.M. Cat. No. 472697); *jamaicensis* C.B.Ad. from Jamaica (U.S.N.M. Cat. No. 66416); and *spinosa* C. & P. from Brownsville, Texas (U.S.N.M. Cat. No. 217054) has shown that the verge is complex, in agreement with that described and

[1] Published by permission of the Secretary of the Smithsonian Institution.

[2] Am. Journ. Conch., I, 1865, p. 53.

[3] Proc. Royal Soc. Tasmania for 1890, p. 90 (1891).

[4] D'Orbigny in Sagra's Cuba, Moll., II, (1841), p. 8.

[5] Bol. Acad. Nac. Ciencas Cordoba (Rep. Argentina), VII, 1884, pp. 461–3, fig. 2.

[6] Bull. Soc. Mal. de France, V, 1888, p. 192.

figured by H. B. Baker[7] for *L. parvula* (Guild.) from Curaçao. The four of six appendages are arranged in a pattern differing from that known for *Littoridina* Souleyet.[8] The eyes are seen as imbedded in the outer base of the tentacles, not on tubercles. All the known members of the group are ovo-viviparous; some females in the St. Croix material had the uterus packed with twenty to thirty shelled embryonic young. These are visible through the translucent shell of the adult female (if cleaned). In fact, all the females of this lot were separated from the males by observation of the *whitish* uterus within the last whorl.

Softening of "dried-in" animals by five to ten minutes brisk boiling in water in a test tube is successful enough to examine superficial or gross anatomical features, whenever the animals have not been destroyed by moulding, decay, or the feeding of dermestids.

To contrast the genera:

Potamopyrgus Stimpson 1865.	*Lyrodes* Doering 1884.
Epidermal spines on shell.	Calcareous spines on shell.
Verge long, geniculate, and simple.	Verge briefly geniculate, and complex (appendages).
Eyes on prominent tubercles.	Eyes not on tubercles.
Oviparous.	Ovo-viviparous.
Range: New Zealand.	Range: East American.

NOTE ON THE GENUS *LUCINA* IN THE WESTERN ATLANTIC

BY RICHARD A. McLEAN

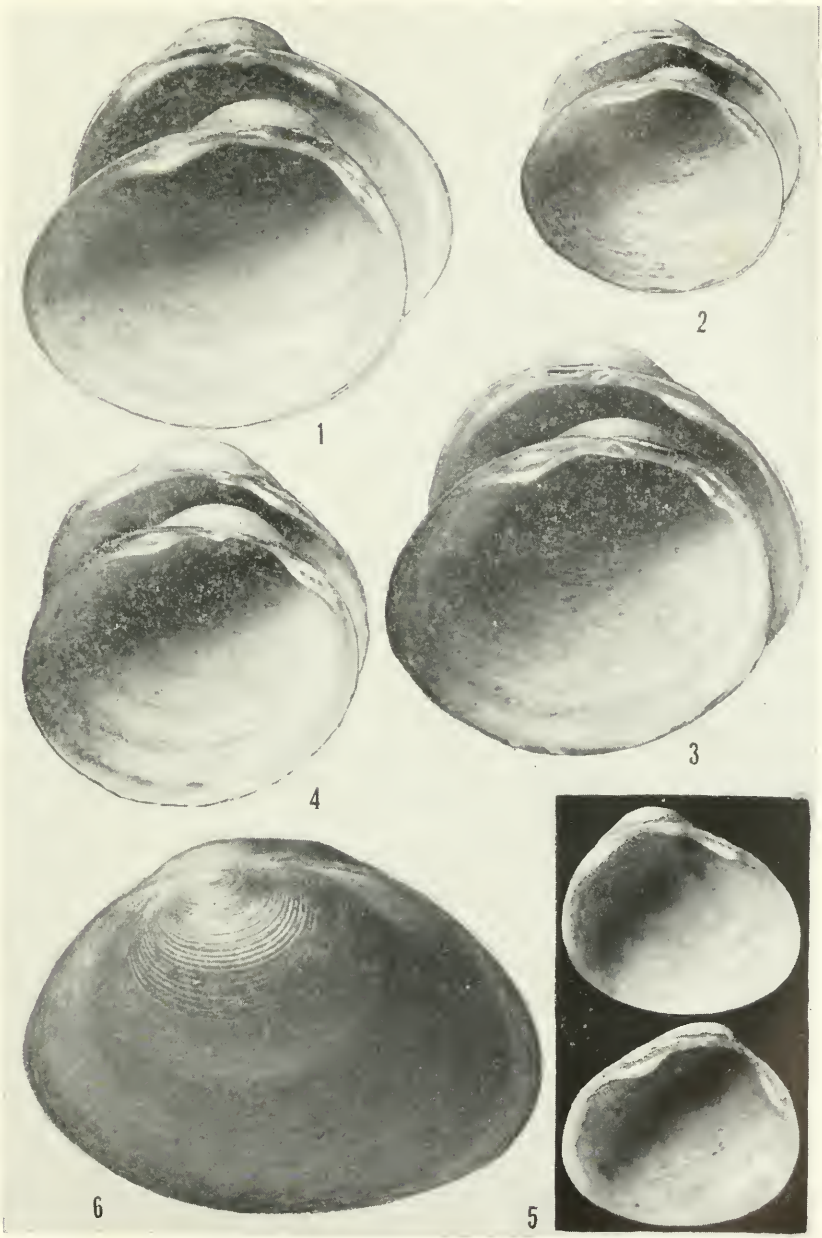
Lucina, in the strict sense, contains only two species in the western Atlantic, these are *L. pensylvanica* L., the genotype, and *L. sombrerensis* Dall, a small deep-water form.

Dall (1901, p. 807–808) lists four species and places them in the subgenus *Here* Gabb 1866, but as Stewart[1] has pointed out this name was proposed for a species that is somewhat different

[7] Occ. papers, Mus. Zool., U. of Mich., No. 210, p. 32, pl. 27, fig. 3 (1930).

[8] Voyage, etc., La Bonite, Zool., II, p. 565 (1852).

[1] Stewart, R. B. 1930. Gabb's California Cretaceous and Tertiary Type Lamellibranchs. Special Publ. No. 3, Acad. Nat. Sci. Philadelphia, p. 175–180.



1, *Pisidium cinereum* Alder, Akatan Island. 2, *P. obtusale* Pfeiffer, Port Clarence. 3, *P. cinereum* Alder, Kodiak Island. 4, *P. lilljeborgi* Clessin, Unimak Island. 5, *P. milium* Held, Akatan Island. 6, *Sphaerium nitidum* Clessin, small shell showing umbonal sculpture, Amlia Island. Figs. 1–5 × 12, fig. 6 × 14.

from the typical Lucinas. If a subgeneric name were needed, *Linga* Gregorio 1885, could be used, but as *L. pensylvanica* L. is the genotype, this is not necessary.

Dall lists, besides the two species mentioned above, *L. adansonii* d'Orb. and *L. aurantius* Desh. The first of these is a small globose form from the Canary Ids. and the second, in my opinion is merely a local variation of *L. pensylvanica* L. This species is extremely variable. With a large series before me containing lots taken all through its range in the western Atlantic I can see no line of demarcation between the very flat type with a conspicuous periostracum and the smooth, deep, *adansonii*-like forms. I do not feel that the deep specimens are *adansonii* as they are consistently larger and not quite as deep as in a goodly series of this species which we have from the Canary Is. The form called *aurantius* by Deshayes is only an extreme case of pigmentation. We have many specimens containing this orange pigment, the coloration varying from a few orange spots located anywhere on the shell to a complete orange margin as in the one figured by Chemnitz and named by Deshayes. Thus, in the western Atlantic we have:

LUCINA PENSYLVANICA (Linné)

Venus pensylvanica Linné 1858, Syst. Nat. Ed. 10, p. 688.

Lucina (*Here*) *adansonii* d'Orb., Dall 1901, Proc. United States Nat. Mus. 23, p. 807.

Lucina aurantia Desh. 1832, Ency. Meth. (Vers) 2 (2), p. 384.

LUCINA SOMBRERENSIS Dall

Lucina sombrerensis Dall 1886, Bull. Mus. Comp. Zoöl., 12, p. 264.

A SINISTRAL SPECIMEN OF *BUSYCON PYRUM* (DILLWYN)

BY BURNETT SMITH

During a recent examination of the *Busycon* material in the United States National Museum the writer was much surprised to find a left-handed or sinistral individual apparently referable to *Busycon pyrum* (Dillwyn).[1] Through the kindness of Doctor

[1] Dillwyn, Lewis Weston: A Descriptive Catalogue of Recent Shells ar-

Paul Bartsch of the United States National Museum it is now possible to present a short notice of this specimen. Doctor Harald A. Rehder of the same institution obligingly arranged for the photographs which are used to illustrate this paper.

The shell under consideration has a long dimension of about 42 mm. The diameter of its last whorl is about 24 mm. at the shoulder keel. The specimen bears the United States National Catalogue number 107054. It is from the Lea collection, and its locality is stated as Gulf of Mexico. In the same box with the sinistral example is a slightly larger normal dextral specimen of *Busycon pyrum* (Dillwyn). This latter is marked with the same museum number. Such marking, of course, does not prove that the two shells came from the same locality in the Gulf of Mexico but there is at least a possibility that such is the case. The left-handed individual shows the real or apparent obliquity of coiling to axis which has been noted in sinistral shells generally. This, however, is not believed to furnish a sufficient argument for specific or varietal distinction. Were there many other specimens like this left-handed channelled *Busycon* the naming of a new species or variety might conceivably be in order. With but one individual at hand it seems more proper to regard the shell as that of a freak *Busycon pyrum* (Dillwyn.) This second course is adopted in this paper. Sinistrality is here individual. Sinistrality of specific value is well established among the Busycons which lack the sutural channel, and it is not unlikely that individual inversions of coiling are also to be found in this group. In the channelled Busycons (*Sycotypus*), on the other hand, specific sinistrality is unknown and the only case of individual reversal known to the writer is that furnished by the subject of this notice—*Busycon pyrum* (Dillwyn) United States National Museum 107054.

The literature of conchology abounds in records of occasional sinistral individuals in species normally dextral. Dextral indi-

ranged according to the Linnaean Method with Particular Attention to the Synonymy. 2 vols. London, 1817. See vol. I, p. 485.

Lister, Martin: Historia Sive Synopsis Methodica Conchyliorum. Editio Tertia. (L. W. Dillwyn, 1823.) See pl. 877, fig. 1.

Martini, Friedrich Heinrich Wilhelm: Neues Systematisches Conchylien-Cabinet. III, 1777. See pl. 66, figs. 736, 737.

viduals of normally sinistral species are also known, but their number appears to be considerably less. In the present paper it is believed sufficient to cite only a few bibliographic titles bearing more or less directly on the case under consideration.

In his discussion of *Sycotypus* Conrad[2] says: "We have no knowledge of any anatomical characters by which to separate this genus from *Busycon,* Bolten, . . . but as the two groups have very characteristic differences in the shells, one being spinous and the other channelled and tuberculated, the one having reversed species, the other never reversed, it is most convenient to regard them as distinct genera," etc.

From this quotation it is quite evident that examples of sinistral channelled Busycons (*Sycotypus*) were unknown to Conrad who unquestionably could speak with authority on both recent and fossil shells of this group.

Lists of individual reversals in coiling have appeared since Conrad's day. The most recent ones located are those of Pelseneer[3] published in 1920 but apparently compiled for the most part in 1914 or earlier. The genus *Busycon* is not given in these lists, and it is therefore probable that the reversed individual of *Busycon pyrum* noted here represents an addition to teratological records.

Explanation of Figures.—Busycon pyrum (Dillwyn). Reversed (sinistral) individual. Long dimension about 42 mm. Diameter of last whorl about 24 mm. at the shoulder keel. Fig. a—View with aperture turned toward observer. Fig. b—View with aperture turned away from observer. Fig. c—Apical view.

[2] Conrad, T. A.: Synopsis of the Genera Sycotypus, Browne, and Busycon, Bolten. Amer. Jour. Conch. 3, 2, pp. 182–185. 1867. See p. 182.

[3] Pelseneer, Paul: L'Inversion chez les Mollusques au Point de Vue de la Variation et de l'Hérédité. Bul. Scientifique de la France et de la Belgique, 48, 1920, pp. 351–380. See pp. 355–362.

Pelseneer, Paul: Les Variations et leur Hérédité chez les Mollusques. Bruxelles, 1920. 826 pp. figs. See pp. 30–37.

TWO NEW PHILIPPINE LAND SHELLS

BY PAUL BARTSCH

Curator of Mollusks and Cenozoic Invertebrates, United States National Museum[1]

Material sent to the United States National Museum makes it necessary to give a status to two new races of Philippine land shells, which is here done.

Eucyclophorus woodianus isabelanus, new subspecies. Plate 7, figs. 2, 3, 4.

This race has the peristome salmon colored, in which respect it resembles *Eucyclophorus woodianus ambubuquensis* Kobelt, from which it can readily be distinguished by its much smaller size and the much stronger spiral sculpture and stronger spotting at the summit of the whorls. The underside also is much darker.

The type, U.S.N.M. no. 314083, which is a rather large specimen coming from Isabela, Luzon, has 5.1 whorls and measures: Length, 20.2 mm.; greater diameter, 27.0 mm.; lesser diameter, 22.3 mm.

The smallest of the specimens in our collection has 4.8 whorls and measures: Length, 16.4 mm.; greater diameter, 26.0 mm.; lesser diameter, 18.9 mm.

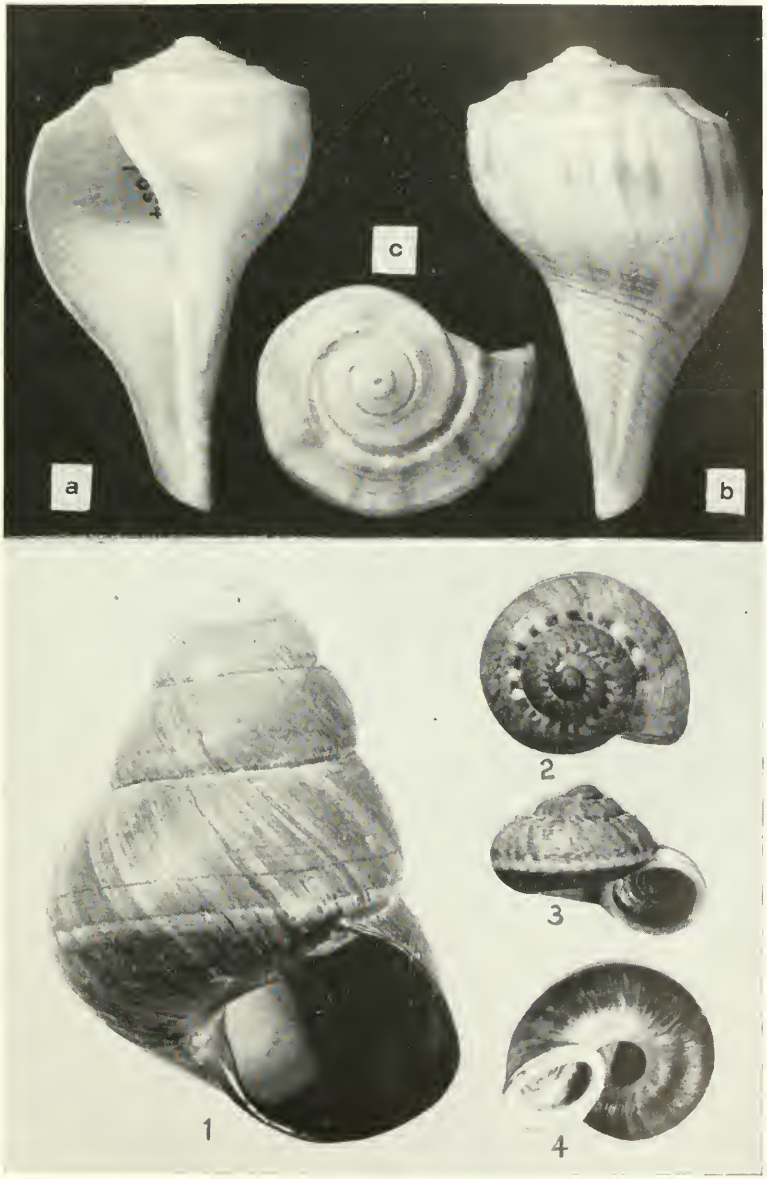
Helicostyla lignaria atra, new subspecies. Plate 7, fig. 1.

This subspecies is distinguished from the other races of *H. lignaria* by its exceedingly dark coloration, in which respect it recalls *H. l. aguinaldoi* Bartsch. It is distinguished from that in having the periphery not well rounded but obsoletely angulated. The color pattern is quite variable, the ground color, of course, being almost blackish brown and the hydrophanous epidermis wood-colored with few or many spiral bands of dark. These bands vary very much in width in different individuals.

The type, U.S.N.M. no. 314082, which comes from Isabela, Luzon, has 6.0 whorls and measures: Length, 73.5 mm.; greater diameter, 52.2 mm.; lesser diameter, 47.7 mm. This is the largest of our series of specimens.

Two additional specimens, U.S.N.M. no. 314084, from the same source have, respectively, 6.0 and 5.3 whorls, and measure: Length, 62.1 mm., 58.3 mm.; greater diameter, 47.4 mm., 50.2 mm.; lesser diameter, 41.7 mm., 43.3 mm., respectively.

[1] Published by permission of the Secretary of the Smithsonian Institution.



Figs. a, b, *c*, *Busycon pyrum* (Dillwyn), sinistral.
Fig. 1, *Helicostyla lignaria atra* Bartsch.
Figs. 2, 3, 4, *Eucyclophorus woodianus isabelanus* Bartsch.

OXYSTYLA FROM WESTERN MEXICO

BY THOMAS L. McGINTY

A magnificent series of West Mexican *Oxystyla* was taken near Acapulco by Dr. Blenn R. Bales of Circleville, Ohio, during the past winter season. Acapulco, in the State of Guerrero, is located on the Pacific some 200 miles by motor from Mexico City. Dr. Bales's enthusiastic letters from Mexico gave us the first hint of the surprise that was in store for us. Later when a large series of the *Oxystyla* arrived, they presented a problem as complex as our own Florida *Liguus*. There are some hybrids, as can be expected among these arboreal snails, living as they do in close proximity to each other. The Doctor enlisted the help of natives in collecting, and hence a much finer series of specimens was obtained. It is interesting to note that the natives fear the snails, believing that the "horns shoot poison." All snails brought in had the apertures carefully packed with leaves to prevent such a catastrophe.

A plate illustrating these shells has been prepared, and will appear in the next Nautilus, with descriptions of new color races of *O. ponderosa* Strebel, and others. Meantime the discoverer and the author join with pleasure in naming this distinctive *Oxystyla* for Doctor Carlos de la Torre, eminent Cuban naturalist.

OXYSTYLA TORREI, new species. Pl. 8, figs. 7 and 8.

Habitat: vicinity of Acapulco.

Shell elongate-conic or ovate conic, rather thick and strong with convex whorls; the second whorl has a decidedly *swollen appearance*, almost to the extent of deformity in some specimens. The last whorl is *very small* and is pinched in at the suture between the two final whorls. Apical mark minute, reddish-brown, earliest $2\frac{1}{2}$ whorls light pink. Ground color of shell brown, yellowish or cream in light shells if the cuticle has been removed. Flammulations brown, irregular, often with a violaceous tinge and not present on the final whorl in light colored shells. A tawny yellow *cuticle* covers the two final whorls. There are three bands on the last whorl. Varices prominent, black-brown, often bordered behind by an olive stripe, and usually four to five on the whole shell. Aperture *very small*, peristome broadly bordered inside with black-brown fading into the white of the interior, other varices bordered outside with light blue-gray;

columella *very heavy* and *twisted,* generally white; parietal callus dark brown.

Holotype: Height 63.5 mm., diam. 29 mm., whorls 7. ANSP. No. 173342.

Paratype: Height 57 mm., diam. 27 mm., whorls 6½. ANSP. No. 173343.

Paratypes in the Bales and McGinty collections.

(*To be continued*)

A SNAIL "TAXI"

BY GORDON K. MACMILLAN
Carnegie Museum

The larvae of certain Neuropterous insects of the family *Hemerobiidae* have the peculiar habit of covering themselves with a protective mat of empty insect skins, bits of bark, fibers of plant and animal origin, pieces of lichens, and spiders' webs. The larvae are furnished at the sides with projections, which serve as pedicles to elongate divergent hairs, and these help to keep the mass in place on the back of the insect. Some fine threads are distributed through this curious mantle and serve to keep it from disintegrating. These threads may be fragments of spiders' webs or threads spun by the insect themselves. The larvae either place small bits of these materials upon their backs with the jaws, or they crawl under them and then shift them in place by body movements assisted by the jaws.

During my four months' collecting trip this past summer throughout West Virginia I came upon six of these snail "taxis" under layers of leaves or between piles of fallen bark. Not only were the mantles constructed of the materials mentioned above but they also had numerous of the smaller snails attached to them. At first it appeared that the shells were just massed together but when I went to pick them up the shell mass began to move.

The snails found on the mantles of these Neuropterous larvae were as follows:—

Helicodiscus parallelus (Say)
Gastrocopta pentodon (Say)
Vertigo gouldii (A. Binney)
Punctum pygmaeum minutissimum (Lea)

Paravitrea multidentata (A. Binney)
Striatura milium (Morse)
Striatura ferrea (Morse)
Hawaiia minuscula (A. Binney)
Zonitoides arboreus (Say)
Zonitoides nitidus (Mueller)
Retinella burringtoni (Pilsbry)
Retinella rhoadsi (Pilsbry)

These shells and larvae were found in woods near Weston, Lewis Co.; French Creek, Upshur Co.; and Parsons, Tucker Co., West Virginia. (See also, Archer, NAUTILUS 51: 105 Ed.)

GARDEN MOLLUSCA IN EASTERN NORTH AMERICA

BY A. F. ARCHER

In the paper entitled "The Habitats of Land Mollusca in Britain," A. E. Boycott, 1934 (Journal of Ecology, Vol. 22, p. 22) mentions the lack of evidence in the literature that there are mollusks in gardens in the United States outside of imported slugs and snails. He points out that the 100 to 300 years that have elapsed since the area was settled by European man might conceivably have been too short a time for any of the native species to have adapted themselves to gardens and houses. The same situation is said to hold true likewise for Australia, New Zealand, and South Africa, where only imported species are recorded as occurring in gardens.

My own field notes and observations indicate that in the case of eastern North America, at least, there is a fairly considerable number of species occurring in gardens, and that they are by no means all imported species. A number of the native species are as abundant in gardens and around houses as they are in any type of habitat that they occupy. This is as true of the areas that have been settled less than 100 years as it is of those of longer occupation. American gardens vary in nature and quality. Vegetable gardens are frequently disturbed by the plow from year to year; when fallow they may harbor a considerable mollusk population. Flower gardens may be frequently and intensely disturbed by weeding and hoeing, or they may be left more or less to them-

selves especially if planted in large flowering shrubs. The older the garden and the less frequently disturbed it is, the larger is the population of snails and slugs. In urban areas the largest mollusk populations are to be found in vacant lots and neglected slopes. In Ann Arbor, Michigan, such sites may harbor in their aggregate 15500 individual snails and slugs per acre. However, such habitats are not to be considered in this paper although their assemblage of species is nearly identical with that of nearby gardens, though slightly larger.

In dealing with the area of eastern North America I shall consider the general region north of the Mason-Dixon line separately from that south of the line, because there are some noticeable differences between the garden faunas of the two regions. The most outstanding feature of the north is the small number of large native species occupying gardens. In the south quite a number of the regular inhabitants are fairly large.

The species commonly inhabiting gardens in the north are:

Anguispira alternata
Cochlicopa lubrica
Deroceras agreste
Hawaiia minuscula
Vallonia costata
Vallonia pulchella
Zonitoides arboreus

Of these seven only one is introduced; three are holarctic in distribution, with only *Cochlicopa* probably autochthonous to Eurasia; and three are definitely confined to America. On poor, unproductive soils (as in New England) from which *Vallonia* is usually excluded, *C. lubrica* and *Z. arboreus* are still present as common units for the whole area.

Species incidentally but inconstantly inhabiting northern gardens are:

Arion circumscriptus
Deroceras laeve campestre
Gastrocopta armifera
*Helix nemoralis**
*Helix pomatia**
Limax maximus
*Oxychilus cellarium**
Polygyra albolabris
Polygyra thyroidus
*Polygyra appressa fosteri**
Polygyra fraterna
Polygyra hirsuta
Polygyra monodon
Succinea avara
Succinea ovalis
Zonitoides ligerus

Species marked with an asterisk are very local introductions; the

Polygyra was brought to New Jersey from southern Illinois; the other species came from Europe. Of the sixteen species only five are not of American origin. *Polygyra albolabris* occurs in gardens in very small numbers.

In the south the following species commonly occur in gardens within their appropriate ranges:

Hawaiia minuscula
Limax flavus
Mesomphix perlaevis
Polygyra appressa
Polygyra appressa perigrapta
Polygyra clausa
Polygyra hopetonensis
Polygyra inflecta
Polygyra rugeli
Polygyra thyroidus
Polygyra tridentata juxtidens
Polygyra vannostrandi alabamensis
Zonitoides arboreus
Zonitoides demissus

Only one of the fourteen species is of exotic origin.

Species incidentally occurring in southern gardens are:

Anguispira alternata
Deroceras agreste
Deroceras laeve campestre
Gastrocopta armifera
*Helix aspersa**
*Helix nemoralis**
Limax maximus
*Oxychilus cellarium**
Polygyra albolabris
Polygyra fallax
Polygyra fraterna
*Rumina decollata**
Vallonia pulchella

The species marked with an asterisk are localized introductions, all of European origin. Of the thirteen species in this list five are exotic, the rest native species.

An inspection of the entire list reveals the fact that out of twenty-two species in northern gardens five are introductions, leaving about seventy-seven per cent as native species. Of the southern garden mollusks six of the twenty-seven species or twenty-two per cent are of exotic origin. I strongly suspect this list of North American garden mollusks to be incomplete. No account has been taken here of mollusks in or immediately around quite artificial habitats, such as greenhouses.

A NEW SECTION AND A NEW SUBSPECIES OF *STENOTREMA*

BY ALLAN F. ARCHER

EUCHEMOTREMA, new section.—Those Stenotremas lacking a subanal denticle. Penis very short and club-shaped; in length less than half the diameter of the shell. Right pilaster very thick, prominent, and blunt-edged.

This section is intended to include *Stenotrema monodon* (Rackett) and *S. fraternum* (Say) as distinguished from the other species of *Stenotrema,* which belong to the section *Stenotrema* (Rafinesque). The latter differs from *Euchemotrema* in the following ways: Subanal denticle present. Penis more or less slender and irregularly sausage-shaped. Right pilaster slender. The name *Euchemotrema* is suggested by *Chimotrema* (Rafinesque) whose identity is somewhat doubtful (H. A. Pilsbry, Proc. ANSP. 1930: 321, 324).

STENOTREMA FRATERNUM MONTANUM, new subspecies.

This subspecies has the general specific characters of *S. fraternum* and *S. fraternum cavum* (P. & V.). Like the latter it is umbilicate, but differs from it in the following ways:

S. fraternum montanum	*S. fraternum cavum*
1. Shell having an angulated periphery (excepting the last ¼ whorl).	1. Shell having a rounded or bluntly rounded periphery.
2. A brown peripheral band present.	2. Brown peripheral band absent.

The shell of *montanum* is more or less lenticular, and due to this fact and to the presence of the brown peripheral band it has been confused with *S. monodon cinctum* (Lewis). In superficial aspect the two are quite convergent. The differences are as follows.

S. fraternum montanum	*S. monodon cinctum*
1. Distal end of parietal lamella not strongly slanting into the aperture.	1. Distal end of parietal lamella strongly slanting into the aperture.

2. Surface of the basal sinus (analogous to the interdenticular sinus) convex.	2. Surface of the basal sinus flattened, dished.
3. Nuclear whorl finely beaded.	3. Nuclear whorl axially striated.
4. Left pilaster of penis simple, slender.	4. Left pilaster of penis thickened, indented; joined to the right pilaster below the mid zone by a commissure.

Holotype of *montanum:* Diameter 11.2 mm.; height 6.0 mm. Paratypes; Diameter 10.5–11.4 mm.; height 5.9–6.8 mm.

Holotype.—Ala. Mus. Nat. Hist., no. 101, 2800 feet elevation, knob at CCC Camp NP–4, Smokemont, Swain County, North Carolina. Paratypes in the Alabama Museum and the ANSP.

Remarks.—This subspecies is confined to the southern part of the Blue Ridge Physiographic Province, chiefly in the Smoky and Black Mountains of western North Carolina and east Tennessee. It is apparently isolated from the main body of *S. fraternum,* and seems to be a definite geographical race. Its recorded range is: Towns Co., Georgia; Cherokee, Mitchell, and Swain counties, North Carolina; Blount Co., Tennessee.

Habitat.—This snail evidently occurs between 2000 and 3000 feet in the lower montane forests. Its plant cover is chiefly xeric oak-hickory. It lives in hollows in humus under the leaf carpet and under quartzite slabs. It is also found under fallen bark around sprouting chestnut stumps and around the boles of white oak (*Quercus alba*) and tulip poplar.

A STUDY OF THE LIFE CYCLE OF THE FRESH-WATER MUSSEL, *ANODONTA GRANDIS,* IN NEW ORLEANS[1]

BY GEORGE H. PENN, JR.

Department of Zoology, Tulane University of Louisiana

Although the life cycle of *Anodonta grandis* Say has been studied in certain details in Illinois by another worker,[2] it was

[1] Presented (in part) at the Eighty-fifth Annual Meeting of the New Orleans Academy of Sciences, Tulane University, March 25, 1938.

[2] M. E. Tucker, 1928. Studies of the life cycles of two species of fresh-water mussels belonging to the genus *Anodonta.* Biol. Bull. 54: 117–127.

deemed advisable to study its life cycle in New Orleans to obtain specific data for this locality, near the southernmost extremity of its range. The work was conducted under the guidance and supervision of Dr. F. H. Wilson. To him, to Walter F. Webb for species determination of the mussel, and to others who lent assistance in collecting, I wish to express my indebtedness.

The material studied was obtained from the Audubon Park Lagoon opposite the Tulane campus in New Orleans. The lagoon is an artificial body of water, dug in 1884 and enlarged in 1917, about one and one-half miles long and averaging thirty feet in width. Its bottom is of soft Mississippi river silt studded in places with numerous broken bricks and coal ashes. The greatest depth is less than ten feet. With the exception of irregular clearing of semi-aquatic plants along the edges, conditions are mostly on a natural biological balance.

Collections of adult mussels were taken from the lagoon at weekly intervals during their gravid period. Each collection consisted of from ten to fifteen specimens picked up at random in less than two feet of water along the edge of the lagoon. During the latter part of the study two collections of fishes were taken with seines in shallow water at the south end of the lagoon and kept in aquaria in the laboratory for periodic examination.

Life Cycle Data.—Four female mussels collected on September 25, 1937 contained unfertilized eggs in the ovaries; in the same collection six males showed milky sperm in the testes. The eggs were perfectly spherical and of a crystalline-yellow appearance; they averaged 0.12 mm. in diameter.

On September 28th the embryos in the marsupial gills had reached the sixteen cell stage. Thirteen days later on October 11th the embryos had advanced to the gastrula stage.

By October 18th the larvae had advanced to the glochidial stage and exhibited clearly the larval thread,[3] adductor muscle, mantle, sensory tufts, and the barbed hooks on the valves. The glochidia averaged 0.38 by 0.36 mm. In this stage and until they were released, the glochidia were a reddish-orange color.

[3] Nomenclature follows: M. E. Tucker, 1927. Morphology of the glochidium and juvenile of the mussel, *Anodonta imbecillis*. Trans. Amer. Micros. Soc. 46: 286–293.

Glochidia from females collected on the dates of October 25th, November 3rd, and November 8th showed no changes in size or visible structure from those of October 18th.

On November 15th, the marsupia of two of the seven females collected were partially empty at the anterior ends. No more than one-sixth of the volume of each gill was released at this date. Several glochidia from these specimens were placed in a castor cup in pond water and exhibited slow snapping movements.

On November 22nd the marsupia of six of the seven females collected were partially emptied (one-eighth to one-fifth), but the other female collected was still distended to full extent.

On November 29th all females collected had released all glochidia from their marsupia. Several days later free glochidia were dipped up with a pan from the silt at the edge of the lagoon. All of these were dead with their valves tightly closed.

On December 16th, several weeks after it was found that the glochidia had been released, six species of fishes (*Helioperca macrochira, Aplites salmoides, Xenotis megalotis, Fundulus chrysotus, Gambusia patruelis,* and *Ameiurus nebulosus catulus*) were caught and the first four of these were found infected with glochidia. Another collection on January 27th, 1938 showed the encysted glochidia remaining on only the first three species.

Juveniles dropped from the fishes in the laboratory aquaria on February 22nd. Others, which dropped from the fishes in the lagoon at about the same time, averaged 1.1 mm. in length.

Summary

1. A study of the life cycle of *Anodonta grandis* at New Orleans showed that the period of gravidity extended from September 28th to November 29th in 1937, a total of 62 days, or nine weeks.

2. The total period of attachment of the glochidia to fishes was 55 days, or eight weeks, from November 29, 1937 to February 22, 1938.

3. Glochidia were found attached to *Helioperca macrochira, Aplites salmoides, Xenotis megalotis,* and *Fundulus chrysotus.* They encysted on the first three species.

NOTE ON PECTEN (CHLAMYS) *MUSCOSUS* WOOD. 1828 AND *P. EXASPERATUS* SOW. 1842

BY HUGH C. FULTON

The Pecten generally identified as *exasperatus* Sow. by American conchologists is the earlier described *mucosus* Wood. The type specimen of Wood's species figured in the "Index Testaceologicus" 1828, pl. II, fig. 2, is now in the British Museum at South Kensington.

The type of *muscosus* is of medium size, uniform brown colour, with well developed fine rib-scales. From Florida correspondents I have received specimens similar to the type specimen of *muscosus* as well as larger and smaller specimens with their rib-scales more or less worn off.

Sowerby's *exasperatus* was described in the "Thesaurus Conchyliorum," Vol. I, *Pecten,* 1842, pl. XVIII, figs. 183–186; these four half-size figures differ from *exasperatus* in having their auricles much more equal in size, more ribs and without the prominent rib-scales of *muscosus.*

Reeve in his "Conchologica Iconica," *Pecten,* 1852, pl. II, gives three figures of *exasperatus* Sow., his fig. 7 agrees with *muscosus* Wood. the other two figs. 8 & 8*b,* are probably varieties of *exasperatus.* Reeve gives another figure of *exasperatus* on pl. XXIX, fig. 127.

Pecten muscosus is variable in coloration, its chief characteristics are its large unequal auricles and (when not beach-worn) prominent scaled ribs.

Sowerby's habitat for *exasperatus* is the Mediterranean Sea. Reeve gives St. John Island, West Indies.

I have received specimens of *muscosus* collected by Mr. W. A. Royce in 16 fathoms at Aladman's Bay, Florida and in 19 fathoms off St. Marks, Florida.

Maxwell Smith in his useful "East Coast Marine Shells" figures *muscosus* on pl. 8, fig. 5, and pl. 9, fig. 4.

CYPRAEIDAE FROM AMERICAN SAMOA WITH NOTES ON SPECIES FROM PALMYRA ISLAND

BY WILLIAM MARCUS INGRAM
Department of Zoology, Cornell University

The American Samoa Cypraeidae included here are from Tutuila Island 14° 19′ S., 170° 50′ W., and from Ofu and Tau Islands of the Manua group 14° 14′ S., 169° 34′ W. The localities from which collections were made in the waters about these islands are Ofu, Ofu Island; Luma, Tau Island; and Fagaitua, Nuuuli, and Pago Pago, Tutuila Island. Fringing coral reefs in these areas provide an ideal habitat for the cowries. The reefs are exposed at low tides and are quite accessible.

The species included here from Ofu and Tutuila Islands were collected by Mr. L. A. Thurston and Mr. T. Dranga of Honolulu, Hawaii, during December of 1925 and January of 1926. Their collections are now housed in the Bernice P. Bishop Museum, Honolulu. The species from Tau Island were gathered by Mr. W. Harris of the United States Navy in 1937 and are to be deposited in the above museum at a later date.

The habitat of several of the species from Tau are based on collection notes sent to the writer by Mr. Harris. The common species in the waters about Tau Island are *Cypraea annulus* L., *Cypraea caputserpentis* L., *Cypraea moneta* L., and *Cypraea mauritiana* L. *Cypraea annulus* L. and *Cypraea moneta* L. are found in quite similar habitats. These two species occur in abundance in branched coral. They are also to be obtained on the dead coral reef and on coral rocks; however, the latter species is more common than the former when collected under such conditions. *Cypraea poraria* L. and *Cypraea helvola* L. are found in the living coral heads, and under blocks of coral rock on the reef platform. *Cypraea mauritiana* L. is typically found in two habitats; in the tidal zone adhering to black coral rocks, and on the outer edges of the reefs. It occurs in greater abundance in the former locality. *Cypraea erosa* L. and *Cypraea lynx* L. have been collected from branching coral heads as well as in crevices in coral rock. *Cypraea obvellata* Lam. is found in company with *Cypraea an-*

nulus L., but is quite rare. *Cypraea talpa* L. and *Cypraea tigris* L. may be collected in association with living coral heads on the reefs between the tide marks. *Cypraea scurra* Chemn. and *Cypraea caurica* L. were collected by Mr. Harris under pieces of dead coral in Pago Pago Bay on the reef table near Goat Island.

Of the 31 species listed here from Samoa 18 occur in Guam, 17 in Hawaii, and 21 in the Christmas, Palmyra, Washington, and Fanning group of Islands.[1, 2, 3]

Cypraea annulus Linnaeus. Nuuuli, Tutuila Island; Ofu, Ofu Island; Tau Island.
Cypraea arabica Linnaeus. Nuuuli, Tutuila Island.
Cypraea arenosa Linnaeus. Nuuuli, Tutuila Island.
Cypraea argus Linnaeus. Nuuuli, Tutuila Island; Ofu, Ofu Island; Tau Island.
Cypraea asellus Linnaeus. Ofu, Ofu Island; Tau Island.
Cypraea caputserpentis Linnaeus. Nuuuli, Tutuila Island; Ofu, Ofu Island; Tau Island.
Cypraea carneola Linnaeus. Ofu, Ofu Island; Tau Island.
Cypraea caurica Linnaeus. Paga Pago, Tutuila Island.
Cypraea cicercula Linnaeus. Pago Pago, Tutuila Island; Tau Island.
Cypraea erosa Linnaeus. Ofu, Ofu Island; Tau Island.
Cypraea errones Linnaeus. Tau Island; Pago Pago, Tutuila Island.
Cypraea fimbriata Gmelin. Tau Island.
Cypraea helvola Linnaeus. Tau Island.
Cypraea hirundo Linnaeus. Tau Island.
Cypraea intermedia Gray. Ofu, Ofu Island.
Cypraea isabella Linnaeus. Ofu, Ofu Island; Pago Pago, Tutuila Island.
Cypraea lynx Linnaeus. Ofu, Ofu Island.
Cypraea mappa Linnaeus. Tau Island.
Cypraea mauritiana Linnaeus. Nuuuli, Tutuila Island; Ofu, Ofu Island; Tau Island.
Cypraea moneta Linnaeus. Nuuuli, Tutuila Island; Ofu, Ofu Island; Tau Island.
Cypraea nucleus Linnaeus. Tau Island.
Cypraea obvellata Lamarck. Tau Island.

[1] Ingram, W. M. *Cypraeidae from Guam,* THE NAUTILUS, Vol. 52, 1938.
[2] Ingram, W. M. *The Family Cypraeidae in the Hawaiian Islands,* THE NAUTILUS, Vol. 50, 1937.
[3] Ingram, W. M. *Cypraeidae from Christmas, Palmyra, Washington, and Fanning Islands.*

Cypraea poraria Linnaeus. Ofu, Ofu Island; Tau Island.
Cypraea punctata Linnaeus. Tau Island.
Cypraea reticulata Martyn. Ofu, Ofu Island.
Cypraea scurra Chemnitz. Tau Island.
Cypraea talpa Linnaeus. Nuuuli, Tutuila Island; Tau Island.
Cypraea testudinaria Linnaeus. Pago Pago, Tutuila Island; Tau Island.
Cypraea tigris Linnaeus. Nuuuli, Tutuila Island; Ofu, Ofu Island; Tau Island.
Cypraea ventriculus Lamarck. Fagaitua, Tutuila Island; Ofu, Ofu Island.
Cypraea vitellus Linnaeus. Ofu, Ofu Island.

Species from Palmyra Island

At this time the writer has additions to make to the Cypraeidae fauna of Palmyra Island.[4] Mr. David Thaanum of Honolulu has informed me that he collected *Cypraea arabica* L. and *Cypraea clandestina* Linnaeus at Palmyra Island. *Cypraea cribraria* L. and *Cypraea goodalli* Gray are also to be added to the cowries occuring at Palmyra Island. The former species is housed in the Bernice P. Bishop Museum collection in Honolulu, and the latter is in the writer's collection. The occurrence of *Cypraea goodalli* Gray at Palmyra Island is a new record in the distribution of this species, and extends its reported range north of the equator to 5° 52′ North Latitude. This species has been reported by Garrett from the Cook, Society, and Tuamotu Archipelagos,[5] and by Hedley from the Ellice and Gilbert Islands.[6]

NOTES AND NEWS

Oreohelix eurekensis uinta is a new form found by Mr. E. R. Eller during his exploration of 1933 on Hominy Creek, R. 1 W., T. 3 S., 3 miles north Uinta Special Meridian, near Whiterocks, Uinta Co., Utah. It resembles *O. eurekensis* Henderson and Daniels closely in shape, texture, color and sculpture but differs by the somewhat wider umbilicus, contained about 3¾ times in the diame-

[4] Ingram, W. M. *Cypraeidae from Christmas, Palmyra, Washington, and Fanning Islands*, The Nautilus, Vol. 51, 1937.

[5] Garrett, A. *Journal of Conchology*, ii, p. 106, 1879.

[6] Hedley, C. *The Mollusca of Funafuti*, Pt. 1, Memoirs of Australian Museum, p. 450, 1899.

ter of shell. Height 8 mm., diam. 4.2 mm., 4¼ whorls. Type in coll. Carnegie Mus., paratype in coll. Acad. Nat. Sci., Philadelphia.

This race is so similar to that found by Henderson and Daniels near Eureka, about 125 miles south of west from Whiterocks, that it would hardly be thought distinguishable if it were not in a different mountain system. No Oreohelix has been reported before from the Uinta Mountains. I am indebted to Dr. Pilsbry for directing attention to its relations.—STANLEY T. BROOKS.

DR. JOSHUA BAILY has been appointed Research Associate in Land Mollusks at the San Diego Museum of Natural History.

MR. GORDON M. KUTCHKA, Carnegie Museum, Pittsburgh, is to be known hereafter as Gordon K. MacMillan.

ORIGINAL COPIES OF SAY'S "AMERICAN CONCHOLOGY."—In Mr. Wheeler's account of Say's American Conchology in the last four numbers of THE NAUTILUS he records twenty-six copies existing in American libraries. Another copy may be added to these. The library of the University of Illinois contains a bound copy of the seven parts and the title pages, the covers being bound in the back. It is complete with 240 unnumbered pages and 68 colored plates. The parts are bound by numbers consecutively, I to VII. The Glossary, however, is missing. This copy was originally purchased by the old State Laboratory of Natural History, now the Illinois State Natural History Survey, by the Director, Dr. S. A. Forbes. There is no date of purchase known for this volume but it must have been in the period between 1880 and 1890. Its source is not known.—FRANK C. BAKER.

AN OBSERVATION ON BULIMNEA MEGASOMA (SAY).—This large lymnaeid is common in sheltered bays of Lake Temagami, province of Ontario. In collecting a large lot at Bear Island, August 22, 1938, the following notes were made:

Young snails up to a shell size of about one inch have a lustrous blackish green un-pitted shell completely coated with a clear jelly of ½ to 1 mm. thickness. The mature snails of a shell length of 1½ inches completely lack this jelly covering. Their shells are a lighter olive brown colour and pitted with whitish "erosions," rendering them conspicuous in the water. In contrast the young

snails are easily mistaken for a knob of wood. The jelly on the latter's shell sometimes holds detritus particles stirred up from the bottom.

To judge by the size of the shell, this slimy covering persists only for the first season of the animal's life. It appears to protect the shell from pitting. At the same time it may render the young snail more inconspicuous than the mature snail to predators. Query: What enemies other than field conchologists, has *B. megasoma?*

Some young specimens were carried back to Toronto. They have been kept in a small aquarium for two weeks now, but have no gelatinous coat.—John Oughton, Royal Ontario Museum of Zoology.

Ostrea virginica Gmelin from Cape Breton Island.—Through the kindness of Mr. G. B. Fairchild, a small series of this species was collected at Baddeck. The specimens are of interest because of their large size.

Length	Width	Thickness	Weight of shells
21 cm.	11.0 cm.	5.0 cm.	516 g.
20 cm.	12.0 cm.	5.5 cm.	776 g.
22 cm.	9.5 cm.	5.5 cm.	501 g.
15 cm.	10.0 cm.	5.0 cm.	363 g.

They occurred on a mud bottom in four to six feet of water in an area of very little tide. The hinge area and fully half of the shell remained buried in the mud. The shells are remarkably soft and chalky, a fact possibly due to the habitat conditions under which they live. Mr. Fairchild remarked that eight people managed a very successful meal of fried oysters from an even dozen of these big fellows.—R. A. McLean.

The Oliver P. Emerson Collection of Achatinellidae.—By bequest of the late Rev. Oliver P. Emerson, his very valuable and important collection of Achatinellidae has become the property of the Museum of Comparative Zoology. This collection is in beautiful condition, with full locality data and long series of the individual species. Many of these could not be duplicated, owing to the changed conditions in the Hawaiian Islands, as

much of the territory from which these shells came has been cultivated and the original forest growth destroyed. The collection consists of nearly 1000 lots, the majority coming from the Island of Oahu.—W. J. Clench.

Helix nemoralis L. at Warm Springs, Va.—Through the kindness of Mr. and Mrs. Norman White, Jr., a small set of *Helix nemoralis* was received that they had collected this August at Warm Springs, Virginia. These were collected about ¼ mile south of the town. The colony occupied an area of about ¼ mile and it was reported that this species had first been noticed about 4 years ago. They may have been introduced from the old colony at Lexington, Va., specimens of which were introduced into Knoxville, Tenn., and reported upon by M. D. Barber (Naut. 31, p. 107, 1918).—W. J. Clench.

Discus rotundata (Müll.) in Massachusetts.—This species has been found in abundance around an old car barn in Dorchester, Mass., by Harry K. Clench. The species occurs throughout western Europe, and evidently has been introduced here recently, as it is very localized. In general appearance the shell is similar to our *Discus c. catskillensis,* except that the European species has distinct radial markings or bands above the periphery. Comparisons were made between European specimens in the collection of the Museum of Comparative Zoology and with the excellent figures in Taylor's Monograph of the Land and Freshwater Mollusca of the British Isles (3, pp. 180–193, pl. 19). —W. J. Clench and G. Banks.

Cyphoma mcgintyi, new species.—The shell is long and narrow, with a high median ridge. Back cinnamon-buff to ivory yellow, the marginal callus white or ivory yellow, more definitely limited than in *C. gibbosa,* with an oblique fold from the inner lip across the front, posteriorly, more or less lost in the callous thickening. Interior vinaceous with a white median spot. Mantle closely spotted. Length 23.7 mm., width 11.4 mm. On a gorgonian in 4 or 5 ft., south of Boynton Inlet of Lake Worth, Florida. This will be figured in a review of the group in next Nautilus.—H. A. Pilsbry.

THE NAUTILUS

Vol. 52 April, 1939 No. 4

TEREBRA FLAMMEA LAMARCK. A NEW RECORD FOR THE UNITED STATES

BY TOM L. McGINTY

On June 7, 1938, the writer took an unbelievably large *Terebra* in Lake Worth near the South Inlet, Boynton, Palm Beach County, Florida. The specimen is in excellent condition, the mollusk having so recently died as to leave traces of occupancy. The shell was found in about five feet of water on a mixed bottom of shell and sand. The writer believes that this *Terebra* is an off shore mollusk having been washed into the Lake through the Inlet by the incoming tides probably in the juvenile stage. Singularly enough the Lake Worth specimen was collected only a short time after it was reported from Puerto Plata, Dominican Republic by William J. Clench. See NAUTILUS, April, 1938, for figures of specimens from China and Dominican Republic. The writer has never before seen or heard of even a recognizable fragment of this *Terebra* being found in Florida.

The Lake Worth specimen in the McGinty collection measures 143 mm. in length with 20 whorls as found but with the decollate portion calculated would measure 154 mm. in length with 30 whorls. This specimen is somewhat larger than those figured in the April issue of the NAUTILUS.

A second and larger living specimen of this *Terebra* was taken by Paul L. McGinty on July 17 under the same conditions in Lake Worth at the south inlet, Boynton. This specimen is not decollate, measures 164 mm. and has the same number of whorls as the example described above, 30. Both specimens appear to be full grown adults. The mollusk proved to be strictly nocturnal, its foot well adapted for plowing, generally completely buried with only the long white siphon in evidence. The foot

of the mollusk is white, lightly streaked above with yellow brown. The horny operculum is small 13 mm. in length and 6½ mm. in width. Sketches of the living mollusk were made to facilitate further study.

TWO NEW MARINE SHELLS FROM THE ALEUTIAN ISLANDS[1]

BY PAUL BARTSCH

Curator of Mollusks and Cenozoic Invertebrates,
United States National Museum

AND

HARALD ALFRED REHDER

Assistant Curator of Division of Mollusks,
United States National Museum

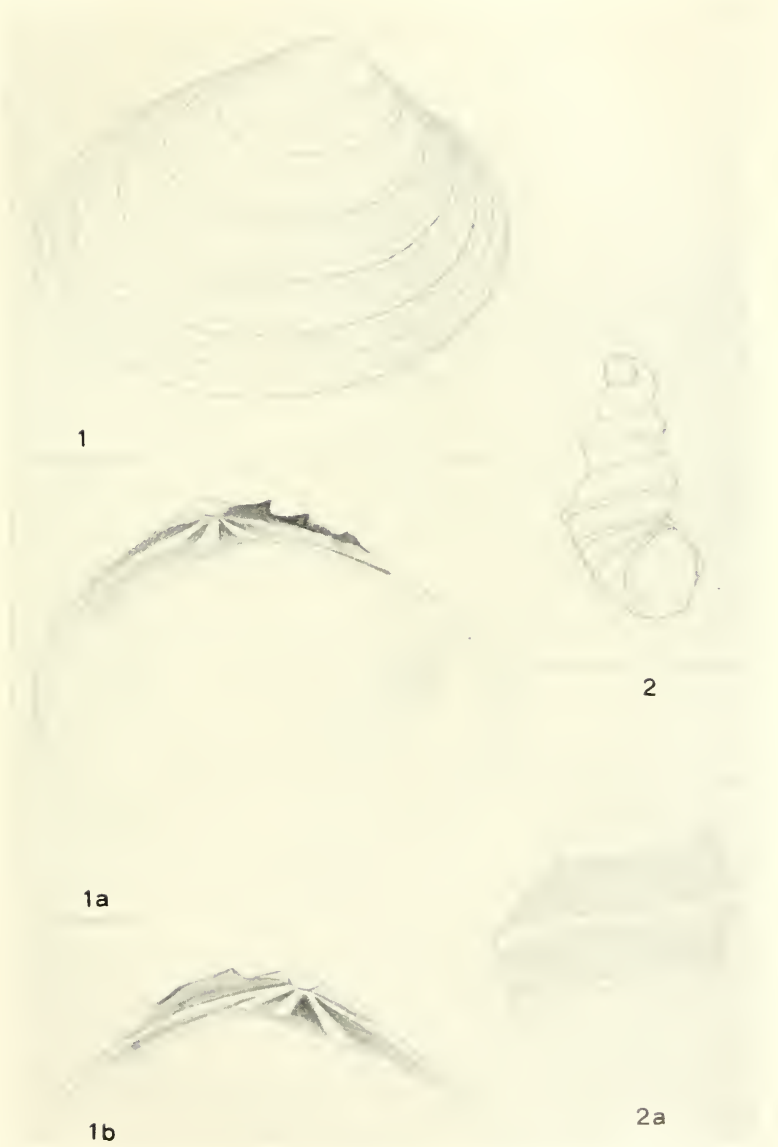
During the explorations of the Aleutian Islands by the staff of the United States Biological Survey, a splendid collection of marine mollusks were obtained. Among them are two new species which are here described.

Anabathron muriei, new species. Plate 8, fig. 2, 2a.

Shell very minute, elongate-conic, thin, semi-translucent, white. The nucleus consists of a single, somewhat inflated, well rounded turn which is slightly obliquely placed. The 2.75 postnuclear whorls bear a strong spiral keel on the middle of the turns. There is a second keel on the middle of the base and a third that bounds the edge of the funnel-shaped umbilicus. In addition to this, the entire surface of the shell is marked by very fine spiral lirations and axial incremental threads, which show as a fine reticulation when seen under high magnification. The umbilicus is broadly expanded and marked by incremental lines and the fine spiral lirations mentioned for the spire. Aperture broadly oval, almost subcircular; peristome slightly thickened. The last whorl is slightly solute.

The type, U.S.N.M. no. 535345, was obtained from the droppings of a sea otter at Ogliuga Island, Aleutian Islands. It measures: Length, 0.8 mm.; greater diameter, 0.4 mm.

[1] Published by permission of the Secretary of the Smithsonian Institution.



FIGS. 1, 1a, 1b, *Liocyma schefferi* Bartsch & Rehder. FIGS. 2, 2a, *Anabathron muricl* B. & R.

We take pleasure in naming this interesting little shell for Olaus J. Murie, the leader of the Biological Survey party.

Anabathron was described in 1867 by Georg Ritter von Frauenfeld in the Reise der Österreichischen Fregatte Novara um die Erde 1857–59, in the part dealing with mollusks on page 13 and figured on plate 2, figures 28. His specimens were obtained in Botany Bay, Australia. It is a long cry from the home of the genotype *Anabathron contabulata* Frauenfeld to the Aleutian Islands.

The figures of his specimens and ours are strikingly similar, but the surface of our individual is marked by the fine lines of growth and spiral threads, which will easily distinguish it from the genotype.

The fact that the specimens were obtained from the droppings of a sea otter does not indicate that the animal feeds upon them. It is more likely that the little mollusk was associated with some other food and taken accidentally into the digestive tract of the mammal.

Liocyma schefferi, new species. Plate 8, fig. 1–1b.

Shell of medium size, broadly rounded, oval; the posterior end slightly narrower than the anterior end; not much inflated, inequilateral, the umbones somewhat anterior to the middle, moderately prominent. The shell is rather stout, of a cream-buff color (Ridgway, XXX, 19″ d), smooth, shiny, with deep concentric grooves rather distantly separated; between these are more or less obscure, irregular concentric grooves. There is no visible lunule, and the ligament lies in a long, narrow, lanceolate furrow posterior to the umbones. The hinge consists of three rather divergent cardinal teeth in each valve. The anterior muscle scars are elongate, slightly flexed, while the posterior ones are suborbicular. The pallial line is well marked and possesses a shallow sinus.

The type, U.S.N.M. no. 535344, measures: Height, 11.9 mm.; length, 14.7 mm.; diameter, 6.4 mm. It and numerous paratypes were collected by Victor B. Scheffer in 10 fathoms off Chuginadak Island, Aleutians, Alaska.

It is close to *Liocyma viridis* Dall, but the sculpture is weaker, the concentric ridges being fewer and more distantly separated.

The shell is also broader and the umbones seem to be generally more centrally located.

This species is named for Mr. Victor B. Scheffer who has collected a large series of mollusks during the last two summers while a member of the Biological Survey expeditions in the Aleutian Islands.

THE DISTRIBUTION OF LAND MOLLUSKS OF ALABAMA FROM THEIR PROBABLE CENTERS OF ORIGIN

ALLAN F. ARCHER

Alabama is a complex area because it contains within its borders representative portions of six physiographic provinces. Each of these provinces is characterized by its own peculiar combination of land forms and geological history. Each of these provinces has its own peculiar flora and fauna.

The nomenclature applied to each of these provinces was first established by N. M. Fenneman in his *Physiographic Divisions of North America.* W. D. Johnston, Jr., has published twice on these physiographic divisions as applied to Alabama. His second paper is entitled *A Revision of the Physical Divisions of Northern Alabama,* and was published in 1932 in the Journal of the Washington Academy of Sciences. Both he and Fenneman recognize only five physiographic provinces in Alabama. Fenneman believed that the Blue Ridge Province does not extend beyond the Coosa River in north Georgia. That would automatically include all the area which I am calling Blue Ridge in the Piedmont Highlands. However, it is the opinion of W. B. Jones, of the Alabama Geological Survey, R. M. Harper, and myself that this is a mistake. The topography and geological history of the doubtful area seems to justify the extension of the Blue Ridge to include the old montane crystalline area of Alabama. Dr. Harper recognizes this area as botanically justified in his monograph entitled *Economic Botany of Alabama,* Geological Survey of Alabama, 1913.

On the map I have outlined the following provinces:

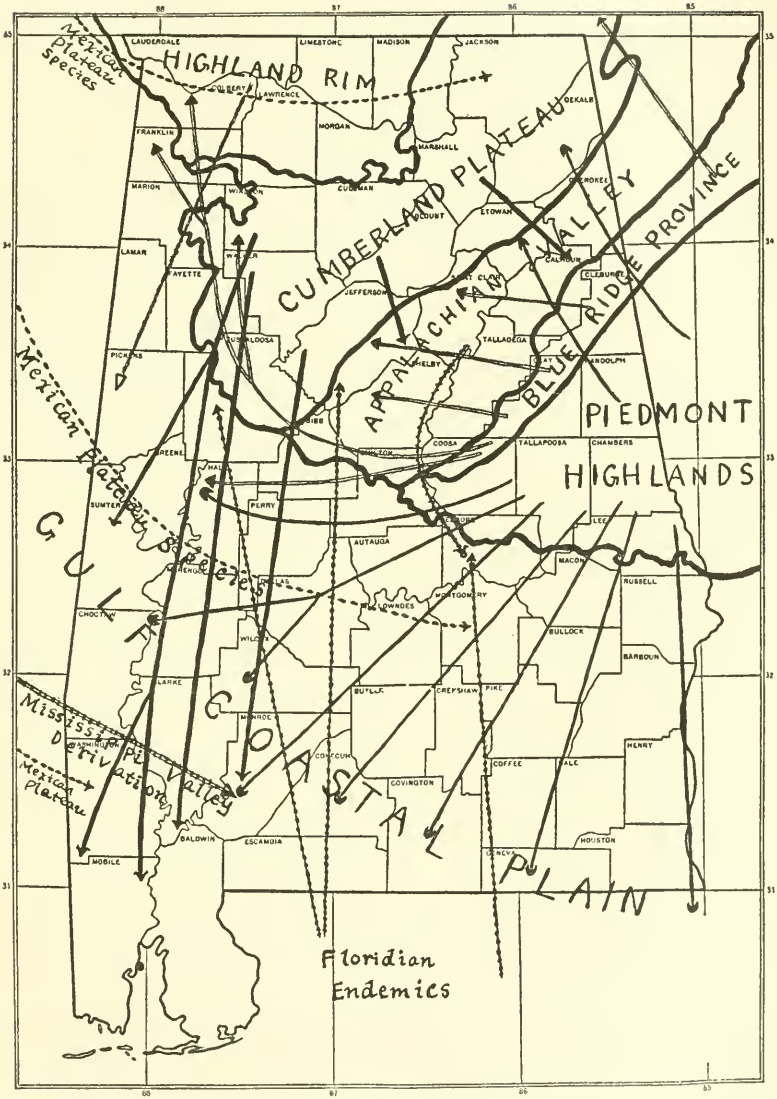


FIG. 1. The distribution of Alabama Land Mollusks from their probable centers of origin, with special reference to the origin of the Fauna of the Coastal Plain.

1. Coastal Plain
2. Piedmont Highlands
3. Blue Ridge Province
4. Appalachian Valley
5. Cumberland Plateau
6. Highland Rim

The Highland Rim is merely a special area of Fenneman's Interior Low Plateaus. The Cumberland Plateau is only a southern division of the Appalachian Plateaus.

The Gulf Coastal Plain has been the avenue for the migration of special elements. The prairie and cedar glade fauna contains elements that probably had their origins in the Mexican Highlands. The Mississippi Valley elements present a special complex, and are more closely related to the fauna of the Interior Lowlands of the Midwest than to that of the eastern Gulf Coast. The region of north Florida is a special area of endemics whose remote ancestors were probably derived from the Texan-Mexican complex. This study is of special interest because the Coastal Plain is a recent land area whose fauna is mostly derived from the old land areas, in spite of the endemism that has occurred in north Florida.

The following facts stand out:

1. The highest degree of endemism in the Alabama fauna is found in the Cumberland Plateau with twenty species, only part of which occur outside of the area. The Coastal Plain follows with twelve species. The Blue Ridge comes next with seven species. The other divisions have much smaller numbers to their credit within the limits of Alabama.

2. The Highland Rim has much in common with the Cumberland Plateau, but lacks endemics.

3. The Highland Rim and the Mississippi Valley have contributed species to only limited areas.

4. The Appalachian Valley has a fauna similar to that of the Cumberland Plateau, but lacks endemics, and has made only minor contributions to other areas.

5. Species of Blue Ridge origin have either migrated into the west-central part of the Coastal Plain, or have penetrated into the

Cumberland Plateau. In both cases their route of migration was by way of the terminus of the Appalachian Valley and the southwestern edge of the Cumberland Plateau, never penetrating far into it, but arriving finally in the Highland Rim.

6. The Cumberland Plateau has been the major contributor to the fauna of the western half of the Coastal Plain.

7. The Piedmont Highlands have been the major contributor to the fauna of the eastern and central portions of the Coastal Plain. One Piedmont species (*Polygyra maxillata*) has spread great distances into the western part of the Coastal Plain, apparently by following the river valleys.

8. The Floridian area has contributed several species to the upper edge of the central Coastal Plain area. This contribution is small, and probably followed both the swamp forests and the prairies.

9. Species of Mexican affinities (*Helicina orbiculata, Bulimulus dealbatus*) have come in both by way of the prairies and by the red cedar thickets, possibly migrating along the north end of the Mississippi embayment of the Tertiary from the Ozark Plateaus.

NOTES ON *STEPHANODA PATAGONICA* (SUTER) AND THE GENUS *RADIODISCUS*, WITH A NEW NAME FOR *R. PATAGONICUS* PILSBRY

BY G. I. CRAWFORD

Assistant Keeper at the British Museum (Natural History)

Three of the original specimens of *Stephanoda patagonica* (Suter, 1900, p. 334, as *Pyramidula*) from a modern deposit at Santa Cruz, Patagonia, are in the collections of the Philadelphia Academy and one is in the British Museum (1900.7.5.9). Pilsbry (1900, p. 387) followed Suter in saying that the apical $1\frac{1}{2}$ whorls of the Philadelphia specimens were smooth, but added (1911) that this was the result of their worn condition, and identified with them some specimens from the Rio Chico, the nepionic whorls of which had spiral sculpture, but no transverse riblets.

On examination I found that the specimen of Suter's species in the British Museum had well marked transverse ribs on the nepionic whorls. At my request Dr. Pilsbry kindly reexamined his

specimens, and wrote to point out to me that they had not only transverse ribs but also a very fine spiral sculpture, visible only with a high magnification and overlooked at my first examination. The apical 1½ whorls of the British Museum specimen are sculptured with low, blunt radial riblets, which do not differ markedly from the riblets of the post-embryonic whorls. These radial riblets are crossed by about 20 very fine raised spiral lines, which also continue faintly on the post-embryonic whorls.

Radiodiscus is defined by Pilsbry in Pilsbry and Ferriss (1906, p. 154) as having no transverse riblets on the nepionic whorls, and Pilsbry (1911) restricts the genus *Stephanoda* to include only species with no spiral sculpture on these whorls. In *S. patagonica* the spiral sculpture is much less well-marked than the transverse, and I therefore consider it to be a *Stephanoda* as far as our present knowledge goes. It is likely that several species supposed to have no spiral nepionic sculpture will be found under magnifications of 60 or 100, to be marked with extremely fine inconspicuous spiral ribs or grooves.

The specimens from the Rio Chico, which are true *Radiodiscus* and lack the transverse ribs of the nepionic whorl, must be given a new name, and, with Dr. Pilsbry's approval, I suggest that they be renamed *Radiodiscus riochicoensis* nom. nov., the type being the specimen figured by Pilsbry (1911, p. 517, pl. 42, f. 1, 1a, 1b). This is No. 88807 in the collections of the Academy of Natural Sciences, Philadelphia.

In the hopes that it will assist the study of these difficult genera I re-describe here the sculpture of type specimens of two Magellanic species, as seen under a monocular magnification of 90.

Radiodiscus magellanicus Smith (1881, p. 36) (B.M. 79.10.15. 93), nepionic 1½ whorls engraved with about 20 fine spiral lines crossing broad, low, extremely ill-defined transverse undulations: post-embryonic whorls with high and narrow transverse riblets, with 3 or 4 very fine low secondary riblets between each pair: no post-embryonic spiral sculpture.

R. coppingeri Smith (1881, p. 36) (B.M. 79.10.15.92), nepionic 1½ whorls with 14 or 15 well marked spiral riblets, crossing undulations similar to those of *R. magellanica:* post-embryonic whorls with high, fairly broad riblets, and no secondary riblets;

the spiral sculpture persists as distinctly raised lines, finer than on the embryonic whorls.

List of References

Pilsbry, H. A., 1900, Poc. Acad. Nat. Sci. Phila., pp. 385–394.
Pilsbry, H. A., 1911, Princeton Expedition to Patagonia, 3(2), pp. 513–633.
Pilsbry, H. A., and Ferriss, J., 1906, Proc. Acad. Nat. Sci. Phila., 58, pp. 123–175.
Smith, A. E., 1881, Proc. Zool. Soc. Lond., pp. 22–44.
Suter, H., 1900, Rev. Mus. Paul., pp. 329–339.

ATYS SEMISTRIATA PEASE IN KANEOHOE BAY, OAHU, HAWAIIAN ISLANDS

WILLIAM MARCUS INGRAM
Zoology Laboratory, Cornell University

As well as the writer has been able to determine there is no account in the literature of the body parts of *Atys semistriata* Pease, nor of the conditions under which this species lives. Dr. Henry A. Pilsbry states, "Very little is known of the ecology of Hawaiian Tectibranchs. Collectors of living specimens should note their stations and such conditions as can be observed."[1] At this time the writer has additions to make to the literature concerning the external body parts, and the ecology of this species of Hawaiian Tectibranch.

During the years 1935–1937 the writer worked in conjunction with Dr. Charles Howard Edmondson of the University of Hawaii and the Bernice P. Bishop Museum, Honolulu, in making a survey of the fouling organisms in Kaneohoe Bay, Oahu.[2] During these years eight individuals of *Atys semistriata* Pease were collected approximately 400 yards from the shore of the Territorial Fish and Game Farm in Kaneohoe Bay at a depth of half a fathom. Data concerning these individuals together with other

[1] Pilsbry, H. A., *Marine Mollusks of Hawaii*—XIV, XV, Proc. Acad. Nat. Sci., p. 360, 1920.

[2] Edmondson, C. H., and W. M. Ingram, *Fouling Organisms in Hawaii*, Occas. Papers, Bernice P. Bishop Museum, pp. 251–300, Vol. XIV, No. 14, Jan., 1939.

mollusca that were associated with the fouling organism masses on submerged panels are included here.

The eight individuals of *Atys semistriata* collected were associated with the ectoproctan bryozoan, *Bugula neritina* Linnaeus. They were confined to this bryozoan, and were possibly feeding upon it or using its branches as clutch for their eggs. These specimens were transferred to the Waikiki laboratory and kept in a container filled with *Bugula*, and supplied by fresh sea-water. During the time they were confined to the container two globular egg masses were deposited amongst the branches of this bryozoan. These masses have an apparently thick outer covering of a gelatinous substance, the eggs being confined to the center of the mass. The eggs are white in color, and the mass is translucent.

A number of mollusks that often frequent habitats offered by masses of attached organisms were collected in association with this tectibranch species. The most common gastropod forms gathered in such a community were: *Peristerina chlorostoma* Sowerby, *Crepidula aculeata* Gmelin, *Triforis incisus* Pease, *Melanella aciculata* Pease, and *Littorina scabra* Linnaeus. *Teredo parksi* Bartsch, the destructive marine borer, was also commonly found in the panels used in the above mentioned fouling organism study.

A member of the family Mytilidae, *Musculus oahuus* Bartsch, was reported by Edmondson and Ingram as occurring commonly in the fouling organism mass.[3] This species was very often found attached to or buried in the tunic of ascidians. The above writers believe that its relationship with ascidians is that of a commensal. Other Pelycopoda that were considered to be fouling organisms of importance associated with *Atys semistriata* were *Ostrea thaanumi* Dall, Bartsch & Rehder, and *Pinctada nebulosa*. The former of these species was proven to be one of the important "foulers" in the Kaneohoe Bay area.[4]

ATYS SEMISTRIATA Pease.

The external body parts: Body blotched irregularly with pinkish spots; these color spots are confined to three zones: anterior, medial, and posterior, with a non-pigmented band between each

[3] Edmondson, C. H., and W. M. Ingram, *op. cit.*

[4] Edmondson, C. H., and W. M. Ingram, *op. cit.*

zone. These color zones run laterally, and are clearly visible throughout the translucent dorsal convexity of the shell. The eye spots are dorsally located close to the mid-dorsal line. The anterior body region is sprinkled profusely with minute pigment granules. The foot is quite long in the expanded condition and is lanceolate. The animal is capable of drawing its entire body within the aperture of the shell.

The shell: The shell is widely umbilicate, oval; color grayish-white, transparent; shell thin with sculpture of engraved encircling grooves; these do not begin from a common center, but run from the inner columella surface, maintaining the same distance apart throughout their length, and form an undulating pattern on the outer lip; the impressed grooves are deeply rounded, and form a broad concave surface at the bottom of the impression; anterior impressed grooves cover three-eighths of the dorsal surface; medial two-eighths of the dorsal surface without grooves; posterior three-eighths grooved; number of impressed grooves vary with the individual; the number of impressed grooves for the eight individuals are in the following table:

Individuals:	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Number of anterior grooves:	17	16	17	12	12	13	11	14
Number of posterior grooves:	14	14	14	12	11	13	10	13

The vertex has a deep concavity about the posterior axis; axial fold high and steep; aperture narrowly rounded posteriorly; the canal is broad and flanges slightly dorsally; outer lip rounded and continuous from the anterior canal to the posterior columella extremity; anterior columella region narrow; widest portion of columella is at the middle.

All of the individuals upon which the above description is based were about 8 mm. in total shell length, the greatest total width being about one-half of the shell length.

The reported distribution of this species in the Hawaiian Islands is as follows: Kauai: Hanalei River and Haena. Oahu: Waikiki Beach, Kahala, Waimanalu, and Kaneohoe Bay. Maui: Kahului dunes. Kahoolawe. The above distribution records with the exception of the Kaneohoe Bay report were made by Pilsbry.[5]

Six species belonging to the genus *Atys* have been reported from the Hawaiian Islands. Of these species two subspecies of *semistriata* Pease are recognized: *Atys kuhnsi* Pilsbry, *Atys semi-*

[5] Pilsbry, H. A., *op. cit.*, publication, p. 365.

striata Pease, *Atys semistriata mua* Pilsbry, *Atys semistriata fordinsulae* Pilsbry, *Atys kekele* Pilsbry, *Atys debilis* Pease, *Atys costulosa* Pease, and *Atys cornuta* Pilsbry. Of these species *Atys kekele* Pilsbry was described from the fossil state. In the description of this species Pilsbry states:[6] "Only found fossil in earth dug out of the taro field probably Pleistocene. It is related to *A. cylindrica* (Helbl.), but in the present species the upper part of the aperture is narrower, the excavation of the summit deeper with angular margin; the base is more effuse, and the columellar callus is more raised, the groove bounding it being wider. Oahu: on taro patch embankment west of Oahu railroad, about a half mile west of Waipahu station, Pilsbry, 1913. Type 116610 A. N. S. P."

A NEW FOSSIL COWRY FROM NORTH CAROLINA

WILLIAM MARCUS INGRAM
Zoology Laboratory, Cornell University

The cowry described here was collected by the late Joseph Willcox along the Cape Fear River, North Carolina. Its geological age is Miocene.

The two specimens upon which the following description is based were lent to the writer for description by Dr. Benjamin F. Howell of The Academy of Natural Sciences and of Princeton University.

The holotype and paratype specimens are so designated under number 781 of the invertebrate paleontological collection of The Academy of Natural Sciences, Philadelphia.

The cowry is named for Dr. Henry A. Pilsbry, Curator of the Department of Mollusca, The Academy of Natural Sciences, Philadelphia.

CYPRAEA PILSBRYI n. sp., pl. 9, fig. 2.

Shell broadly ovate; spire obscured; anterior and posterior

[6] Pilsbry, H. A., *op. cit.*, publication, p. 366.

canals produced but slightly; anterior canal of holotype 2 mm. broad, of paratype 2.25 mm. broad; posterior canal of holotype 2.10 mm. broad, of paratype 3 mm. broad; shell on columellar and outer lip sides of anterior canal flanged; the columellar flange of the holotype is 2.90 mm. broad, of the paratype 3.50 mm. broad; the outer lip flange of the holotype is 2 mm. broad, of the paratype 2.50 mm.; outer lip side of posterior canal more produced than columellar lip side, especially in the paratype; slight indications of a depressed groove exist dorsally on either side of the anterior canal; posterior canal notch deep, about 2.50 mm. on holotype, and 3.5 mm. on paratype; base rounded at point of maximum width of columella, base flat or nearly so from this point to anterior canal extremity; outer lip side of base but slightly rounded, nearly flat in the paratype, and slightly more rounded in the holotype; aperture very wide anteriorly, about 4.75 mm. at point of maximum width in the holotype, and about 5.25 mm. in the paratype; aperture curved to the left both anteriorly and posteriorly; columella teeth nearly lacking, 5 obscure ones, located in the anterior canal region, are present in the paratype, 4 others are present posteriorly that are very indistinct; in holotype only 4 columella teeth are present in the anterior canal region; in both holotype and paratype the anterior 2 columella teeth are closer together than are the others; columella teeth are more in shape of nodules than raised ridges; outer lip ones in type are prominent, the anterior teeth are the most delicate, becoming coarser toward the middle region of the outer lip (this applies to the paratype also); outer lip teeth extend for a short distance over the base of the shell; interstices between the columella teeth are nearly flat, and are broad; interstices between the outer lip teeth range in width from .90 mm. to 1.10 mm.

Measurements of holotype: Maximum length 27 mm.; maximum width 18 mm.; maximum height 15 mm.

Measurements of paratype: Maximum length 32.10 mm.; maximum width 22 mm.; maximum height 17.50 mm.

This species is most closely allied to *Cypraca carolinensis* Conrad.

The writer wishes to thank Mr. C. D. West, of the Department of Zoology of Cornell University, for photographing the type specimen.

A NEW COWRY *CYPRAEA JENSOSTERGAARDI*

WILLIAM MARCUS INGRAM
Department of Zoology, Cornell University

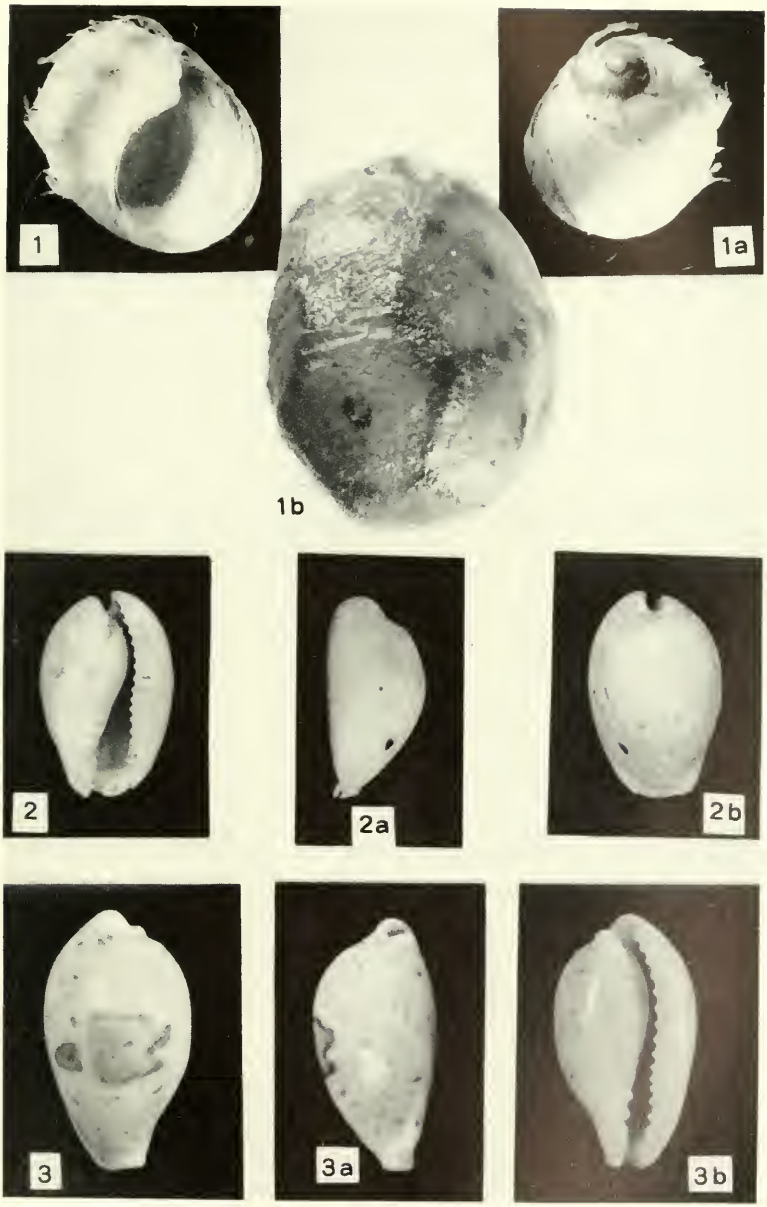
The writer has been able to obtain only one specimen of this small species. It was collected by Mr. M. Nakamura in the living state in the waters about Koror Island, Palau Group, Caroline Islands, and was sent to the writer through the courtesy of Mr. Yoshio Kondo of the Department of Conchology of the Bernice P. Bishop Museum, Honolulu.

This species is named for Mr. Jens Mathias Ostergaard of the Department of Zoology of the University of Hawaii, who has long been an inspiring teacher and an enthusiastic student of the Cypraeidae.

CYPRAEA JENSOSTERGAARDI n. sp. Pl. 9, figs. 3.

Shell characteristics: Shell obovate, light; abrupt slope from point of maximum height of shell to posterior canal, gradual slope to anterior canal; just dorsal to projection of posterior canal, shell is deeply umbilicate to such an extent that a shelf is present over the slight projection of the posterior canal; anterior canal projects slightly, leaving an impressed groove on the lateral shell margin on the left for a distance of about 3 mm., an impressed groove is also found on the right lateral margin of the shell extending posteriorly for about 5 mm.; a shelf of about 1 mm. broad is present over the anterior canal; posterior canal is curved to the left, and is about 1.10 mm. broad; anterior canal but slightly curved to the left, and about 1.75 mm. broad; base rounded; aperture curved to the left posteriorly, straight anteriorly; aperture narrowest posteriorly, about 1 mm. broad, widest anteriorly, about 2 mm. broad; columellar teeth extend over base about 1 mm.; columellar teeth on base are very narrow, and end on columella in knob-like projections; columellar teeth do not extend into aperture on columella; interstices between columellar teeth broad, slightly concave, and equal in width; outer lip teeth broader than columellar teeth, and form slight rounded ridges for a distance of about .75 mm. over base; interstices between outer lip teeth equal, broad, and slightly concave.

Color characteristics: Dorsal surface light brownish-ivory with unequal light brown spots scattered over surface, two unequal light brown blotches occupy center of dorsum; lateral margins



FIGS. 1, 1a, 1b, *Lamellaria sharoni* Willett. FIGS. 2, 2a, 2b, *Cypraca pilsbryi* Ingram. FIGS. 3, 3a, 3b, *Cypraca jensostergaardi* Ingram.

light brownish-ivory with scattered unequal light brown spots; base ivory-white with nearly obscured sparsely scattered light brown unequal spots; columella ivory-white with three unequal light brown spots on point of maximum width; interior of shell ivory-white. Interstices between the teeth are white. No mantle line is visible on the dorsal surface.

Measurements: Greatest length 17.25 mm.; greatest width 10 mm.; greatest height 9 mm.

The holotype specimen is numbered 1114 in the writer's collection. I wish to thank Mr. C. D. West of the Department of Zoology of Cornell University for taking the photographs of the type.

DESCRIPTION OF A NEW MOLLUSK FROM CALIFORNIA

BY G. WILLETT

On several occasions during the past two years, Mrs. Rubie E. Sharon, of Hermosa Beach, California, has brought in specimens of a small mollusk with internal shell which she had collected at Anaheim Bay, Orange County. Two specimens of the same species, collected in Newport Bay, were also shown me by Mr. and Mrs. E. P. Chace. Recently, at my request, Mrs. Sharon brought in two living examples, one of which was photographed, then cleaned, and the other preserved as an alcoholic specimen. I am unable to refer them to any described species; therefore, they may be known as

LAMELLARIA SHARONI, sp. nov. Pl. 9, figs. 1, 1a, 1b.

Description.—Shell fragile, entirely internal, naticoid, inoperculate, imperforate; white, covered with a very thin, light pinkish epidermis. Aperture rounded below, the outer lip and columella merging to form three-fourths of an almost perfect circle. Outer lip thin, meeting the body whorl at an acute angle. Columella light brown, thin, regularly curved, with a shallow groove between it and the body whorl. Surface of shell marked by irregular growth lines and very fine spiral striations. Shell higher than wide, about the shape of some specimens of *Polinices altus* Dall, though very much smaller. Measurements of shell: Max. diam., 5.5; min. diam., 4.9; alt., 7.4 mm.: Aperture, alt., 6; diam., 4.3 mm.

Mantle of animal completely covering shell, roughly papillose, vinaceous rufous above, somewhat lighter below. In the center of the mantle, above, is a rather poorly defined hexagonal, flattish area, the diameter of which is about one-fourth the length of the animal. From each of the six angles of the central area a poorly defined ridge runs to the lower part of the mantle, each ridge being ornamented with from one to three dusky spots; also in the middle of the central area, and in each of the six areas between the ridges is a single black spot (Fig. 1b).

Type, No. 1059 Los Angeles Museum, collected by Mrs. Rubie E. Sharon among marine vegetation at extreme low tide, at Anaheim Bay, Orange County, California, January 6, 1939. Paratypes in collections of Mrs. Sharon, and Mr. and Mrs. E. P. Chace. An additional alcoholic specimen in the Los Angeles Museum.

The naticoid form of this shell at once distinguishes it from *Lamellaria stearnsi, diegensis, rhombica,* or *digueti,* as well as from any other species of the group known to the writer. Of the subgenera usually placed under *Lamellaria,* it is probably closest to *Marsenina* or *Coriocella* in shell characters. The mantle, however, is not fissured.

ASPECTS OF DEPAUPERIZATION

BY CALVIN GOODRICH

Depauperization as it is understood by malacologists is the outward manifestation of disease, accident or malnutrition or a reaction to inimical environment. It affects individual mollusks fairly frequently, but also it sometimes involves whole colonies and races. It is so common a phenomenon that authors usually have been content with merely mentioning it as an observation or, going farther, registering it by such a specific or subspecific name as *pauperculum.* But what may be termed the symptoms of depauperization have not been defined so far as the writer can discover. It is intended here to mention those signs, indications or marks of it that have come to his attention.

The most obvious symptom is dwarfing. In the sandy regions of eastern Michigan is a form of *Polygyra albolabris* to which the varietal name *maritima* is commonly given. Outside of the damp

ravines and river banks, it is the only form of the species occurring in the areas. It is sometimes surprisingly small. Rain in the districts has a rapid run-off. Upland woods become exceedingly dry by mid-summer. So on top of hibernation, a fairly long aestivation is imposed on the snails. Lack of moisture circumscribes the season of activity and that, it would seem, brings about a reduction of whorl size. The same kind of hardship is experienced by *Aplexa hynorum* and *Lymnaea palustris* that occupy woods pools. They appear invariably to be smaller than the same species in brooks and ponds. The water of one woods pool of which I kept watch one spring lasted for only six weeks. Late in the year, living mollusks were dug from the mud that lay under the hard crust. It may be that the comparatively small size and thinness of *Sphaerium occidentale* are due to living in pools and ditches that dry up with the rise of atmospheric temperature. At the other extreme so far as habitat is concerned are those species of *Pisidium* that manage to maintain existence in the bottoms of lakes which for days or weeks contain no free oxygen. Such species of these that have been seen are small even for a genus of small bivalves. A robust form of *Lithasia obovata sordida* lives in Calfkiller River, White County, Tennessee. Above the town of Sparta and about a hundred feet from the river is a torrent of water called Wildcat Spring. It is occupied by a phase of *sordida* scarcely half the size of the stream form. A rarer mollusk of the spring is *Goniobasis edgariana*. It, too, is dwarfed. Those mountain-climbers *Goniobasis proxima* and *aterina* are possibly only stunted phases of lowland species, living under much harder conditions than the latter. Both have been seen in situations beyond the heavy currents of hill brooks, but where the spray fell. In the Great Lakes are dwarfed aspects of *Lampsilis, Elliptio, Lasmigona, Ligumia, Quadrula* and *Obovaria* which have been provided with distinctive names mainly because of their small size. Brown, Clark and Gleissner (1938) have shown that complete intergradations occur between the lake shells and shells of the same species inhabiting streams nearby. They conclude that "The degree of stunting in Lake Erie for all species studied is definitely correlated with the degree of exposure found in the habitats. The more stunted individuals were found in the more

exposed lake habitats." The instances cited can be taken as examples of depauperization for which severe or rigorous conditions of environment are responsible. But dwarfing does occur, of course, among individuals of colonies most of the members of which can be rated as of normal size. Here other factors have acted as checks to growth. The under-developed or abnormal radula that is seen once in awhile is a clue to such an agency.

S. G. Rich (1915) records finding *Elliptio complanatus* in a pond of a granitic area of Maine the specimens of which are remarkable for the lack of nacreous material. "When fresh the shells are horny and somewhat flexible, not unlike two layers of parchment pasted together, in texture. Alcoholic material and fresh are alike easily cut with a small shears, and there is no cracking." The measurements he gives conform with those of lake-inhabiting *complanatus*. No abnormalities of soft parts were observable, but the shape was not that common to the species. The case is perhaps more interesting as evidence of adaptability than as sign of depauperization, yet any departure from a normal state sets up a threat to extinction which is the main element involving depauperization. *Margaritana margaritifera* has offset the low percentage of calcium carbonate of the waters it inhabits by undergoing exceedingly slow growth rather than by normal growth and dependence on the epidermis as a substitute for shell material. That the Maine *E. complanatus* found by Rich has not done the same thing argues that this colony has not been long in its location. In *Vitrinizonites latissimus,* we have a land mollusk that flourishes without the usual buttressing of the epidermis. While it can hardly be called depauperate, its distribution is checked very much as if it were. Plainly, a mollusk may waver upon the border between successful adaptation and extinction through loss of some component or function which is common to its class.

In *Goniobasis,* very loose coiling appears to be a sign of depauperization. *G. acutocarinata,* although described as a species, has not been found in pure colonies. Lea, its author, had only one specimen. The shell occurs as a rare variant among *G. clavaeformis* in springs and spring branches of East Tennessee. Anthony's *Melania pagodiformis,* synonymized with *acutocarinata* by Tryon, came from Battle Creek, a tributary of the Tennessee

River west of Chattanooga. Anthony obtained, he indicates, several specimens. The creek has been collected in by H. H. Smith, Henry van der Schalie and, on two occasions, myself. None of us obtained shells of the sort. *M. pagodiformis* is to be considered an aberrant as is also *M. torulosa,* another Anthony species of the kind. It was named from one example. The common form of *Lymnaea obrussa* in Menominee County, Michigan, is *exigua.* It is very loosely coiled, and sometimes to such an extent as to seem deformed. It lacks the robust look of *obrussa* typical. In instances of loose coiling in *Pleurocera alveare,* the aperture is very small, showing that the animal itself has been small, and in all likelihood in poor physical condition.

If the aberrant occurrence of loose coiling in freshwater gastropods suggests depauperization, it cannot be said to do so in the case of land shells, or at least some of them. *Anguispira alternata* of Lake Erie and Detroit River islands is high compared with diameter, the newer whorls dropping below the plane of the older whorls. In these localities, the species lives in the open—the moisture being sufficient to relieve the snails of the necessity of seeking shelter under logs and stones. New growth, therefore, is not made in circumscribed situations wherein tight coiling would be a measure of space economy.

Certain manifestations of the simplification of shell characters are akin to depauperization though probably not always true instances of that behavior. The dentate process in *Polygyra albolabris* seems to be present in only the healthiest colonies. It is mostly eliminated in the subspecies *maritima,* so far as specimens at hand show. The spinose forms of *Io,* the more nodulous forms of *Lithasia* and *Eurycaelon,* and the plicate-striate *Goniobasis* are, almost entirely, the inhabitants of large streams. As tributaries are invaded, the sculpture is reduced or it disappears altogether. In most cases, it is the plicate, or axial, sculpture which persists the longest. This seems natural since it is apparently the most ancient of such characters. *Campeloma decampii* W. G. Binney (*Paludina spillmanii* Lea), occurring in north Alabama, is carinate or striate on one or two early whorls. Very rarely, a faint keeling, corresponding to this sculpture, shows up among embryos of the northern *C. decisum.* There is a harking back in these cases

to *C. multilineata* and *multistriata* of the Cretaceous. *Campeloma* has undergone a simplification of shell just as its radula, by every sign, has deteriorated. The several subspecies of *Valvata tricarinata* represent modifications of the strongly keeled typical *tricarinata* rather than development from simplification to elaboration. In what remains of the original lot of *Lithasia plicata* Wetherby, there are smooth shells as well as plicate ones, and the smooth specimens are not much different from *L. obovata* of the upper Kentucky River whence the types of *plicata* came. The same sculptured shells appear among smooth forms in small streams of Tennessee. Of 151 specimens of *Goniobasis ebenum* taken in the Cumberland River at Pineville, Bell County, Kentucky, thirteen were found to be plicate. A pure colony of plicate *ebenum* occurs in the South Fork of the Cumberland in Wayne County, Kentucky. The outer lip of mature *Goniobasis livescens* of Ohio and Michigan is sinuous, but specimens taken in Niagara River just above and just below the Falls have straight lips.

Shell simplification is at times carried to such a point that anything definite in the way of character is lost. That is, a shell may have the features of shells in general, and not much else that a describing naturalist, if put to it, could swear to. So descriptions frequently are found to deal merely with size, texture, color and shape of whorls—characters that are seldom constant even in a single colony. The steps in such simplification are those observable in depauperization, and I think it might be demonstrated that the two processes are reflections more or less of each other.

References

S. C. Rich, An Aberrant Ecological Form of Unio Complanatus Dillwyn. Science, 40, 1915, pp. 579–580.

C. J. D. Brown, Clarence Clark and Bruce Gleissner, The Size of Certain Naiades from Western Lake Erie in Relation to Shoal Exposure. Amer. Midland Naturalist, 19, 1938, pp. 682–701.

CERTAIN MOLLUSKS OF THE OGEECHEE RIVER, GEORGIA

BY CALVIN GOODRICH

Conrad described and figured *Paludina genicula* in "New Fresh Water Shells of the United States" (1834) from a single shell which he found in Flint River, Georgia. He twice mentioned the angulation of the whorls, and to keep attention upon this fact of angulation he figured the shell from the back, the position in which the feature is most pronounced. On top of this, he chose *genicula* for specific name, one definition of which is "angulated bend."

W. G. Binney, "Land and Fresh-Water Shells of North America" (1865), threw Conrad's species into the synonymy of *Melantho decisa* (Say) on the ground that specimens he had from the type stream "show a gradual series from the rounded whirls of the *decisa* to the angular form of *genicula,* though none of the shells were as well marked as that figured."

Dr. Henry van der Schalie made a molluscan survey of the Ogeechee River of Georgia in 1937. This is a stream paralleling the Savannah River. It is so worn down to such a grade that a part of the upper waters runs through swamps and parts of the middle river expand into areas which locally go by the name of lakes. The tides are felt well up-stream. The commonest gastropod taken is this mollusk that, if a good species, we would know now as *Campeloma geniculum.* Undischarged young are of about two and a quarter whorls in development. They show no more whorl shouldering than do the young of *C. decisum* of the north. But in young that have been discharged this character makes itself manifest toward the end of the second whorl, or at the beginning of the third. The angulation becomes more pronounced with further growth. It is attended with a flattening of the whorls between suture and periphery. Two headwaters lots have indexes of obesity of 71.4 and 73.3 per cent respectively; the two lowermost lots, indexes of 77.3 and 76.3 per cent. The change in relative obesity does not affect the angulation. It is present in all the shells taken from the Ogeechee River, and this is true also of *Campeloma* collected in the tributary Canoochee River. Of about three hundred specimens, only one is sinistral. Some of the shells

contained ova, a few of them juveniles, but apparently the spawning season was nearly over. The month was August.

C. geniculum occurs in the coastal plain from North Carolina to Florida and Louisiana. It appears to be especially common in west Florida and south Alabama, to judge by collections made by H. H. Smith and T. H. Aldrich. Of sixty-six lots at hand, only three are from localities above the Falls Line. These were taken in Abbeville County, S. C., Bartow County, Ga., and Talladega County, Ala. Four lots, aside from the sixty-six, are transitional from *geniculum* to what has been named *C. limum* (Anthony). They are possibly Pilsbry's *C. rufum geniculiforme*. In several Alabama streams, *geniculum* is a headwaters form and *limum* (so named) the down-stream form. We may suppose this to be the case also in Flint River, Ga., whence Conrad obtained his one specimen and Binney his several. That distinctive specific names are warranted where characters come and go, as it were, if of course debatable. Judged on a strictly biological basis, there seems to be excuse enough for Binney's course in throwing *genicula* among synonyms. This is a matter that has probably bedeviled all observers. C. C. Adams solved the problem satisfactorily as regards the genus *Io*. Yet the solution is not everywhere applicable. What is needed is a nomenclatorial term, other than subspecies or form, that can pigeon-hole the varying phases of a mollusk that undergoes changes of character with changes of position in stream.

Other gastropods collected with the *Campeloma* were:

Succinea floridana Pilsbry. A single specimen turned up in dredgings.

Helisoma antrosum (Conrad). A few rather small specimens.

Helisoma trivolvis (Say). Dead specimens, not exceeding seven or eight in number. Probably nowhere plentiful in the basin.

Physa cubensis Pfeiffer. A single specimen appears to be this species.

Physa heterostropha Say. One individual very like shells from Delaware River, the type locality.

Ferrissia rivularis (Say). Two shells among debris of dredgings.

Valvata bicarinata Lea. From two or three to a dozen specimens were taken at virtually all the collecting localities. They are

all alike in having depressed spires and lacking peripheral carinae. Comparison with two subspecies of *bicarinata* of Michigan suggest that the middle western shells are derived out of *tricarinata* rather than *bicarinata.*

Amnicola limosa (Say). Occurs apparently in all parts of the Ogeechee River.

Amnicola olivacea Pilsbry.

Amnicola integra (Say).

Somatogyrus aureus Tryon. This species and the two preceding ones came from one section of the Ogeechee. Bottom was of sand and mud, covered over with twigs and leaves; it was of sufficient stability to permit the growth of patches of water lilies. The locality was above tidal influence. Current speed varied from two to five or six miles per hour.

Goniobasis catenaria postellii (Lea). Found living only in headwaters of the Ogeechee. The shells have the peculiar bullet-like shape of those taken presumably in the lower part of the Altamaha River by James Postell. This tendency toward the cylindrical is not shown in all the specimens or in those collected by Clench and Okkelberg in the Ocmulgee River, a tributary of the Altamaha.

The family Sphaeriidae was represented by:

Sphaerium striatinum (Lamarck). Taken in two places. Seemingly uncommon.

Pisidium compressum Prime. Rare, and occurring with

Pisidium virginicum (Gmelin). Collected in sixteen localities of the Ogeechee and in four places in the Canoochee River. Some of the specimens are very large as compared with examples of the species taken in the Middle West.

Eupera cubensis (Prime). A single, living, well-marked specimen was taken in the lowermost locality of the Ogeechee. The habitat contrasts with Weduska Shoals of Coosa River, Shelby Co., Alabama, where H. H. Smith came upon the species.

The Amnicolidae were kindly identified by Dr. Elmer Berry.

MEXICAN MOLLUSKS COLLECTED FOR DR. BRYANT WALKER IN 1926, PART 3

BY H. BURRINGTON BAKER

The first paper on this collection appeared as Occ. Papers Mus. Zool. Univ. Mich., no. 193, and contains (pp. 1–25) a detailed discussion of the localities and the symbols utilized for them. In the following descriptions of new species and subspecies, only the type locality is cited.

SPIRAXIS (PSEUDOSUBULINA) IRREGULARIS NEGLIGENS, new subspecies.

Shell subulate-turrite, greenish yellow to whitish, translucent, irregularly thread-costulate. Whorls 11¼, flattened, with prominent, quite simple suture. Apex narrowly rounded; embryonic whorls 2¼, quite rapidly widening, almost smooth except closely ribbed last whorl. Later whorls short, gradually increasing; first with 57 juxtaposed threads; second with 46 and third with 44, separated by subequal interspaces; remainder with low but sharply-marked threads which are quite irregularly spaced and often occur in pairs, separated by wide striate interspaces. Aperture small, ovate-quadrate, with longest dimension about 40° to long axis of shell; peristome inclined about 15°, weakly arcuate, quite simple. Columella concave, markedly truncate. Alt. 8.48 mm., diam. 28 (2.34 mm.), alt. last whorl 33 (2.84 mm.); aperture: alt. 20 (1.66 mm.), diam. 69 (1.15 mm.).

Necaxa, alt. 5000 ft. (AB, III, a, 34). This subspecies is much slenderer than typical *S. irregularis* (Pils.) from Texolo, V. C. A form with stouter middle whorls, which give the shell more convex outlines, occurs with *S. i. negligens* and approaches the typical form more closely. An example (AB, III, a, 41) measures: alt. 9.25, diam. 29 (2.68), alt. last whorl 34 (3.12); aperture: alt. 21 (1.96), diam. 68 (1.34); whorls 11.

S. (P.) VENTROSUS, new species.

Shell urocoptoid-turrite, greenish corneous, somewhat translucent, regularly and very closely thread-costulate. Whorls 11, flattened, with telescoped suture. Apex relatively small, rounded-ogival; embryonic whorls 2¼, of which last 1¼ begin neanic sculpture. Later whorls short, more rapidly increasing near apex than towards base, with rather shallow suture; first with 52 low threads and slightly narrower interspaces, which show weak spiral striae; second with 59, third with 67, last with 92 threads that are consid-

erably wider than their interspaces and are weakly crested below suture. Aperture trapezoidal-lanceolate, oblique (long axis 40° to that of shell); peristome almost vertical and little arcuate. Columella concave, strongly but obliquely truncate. Alt. 12.69, diam. 27 (3.48), alt. last whorl 36 (4.62); aperture: alt. 23 (2.89), diam. 64 (1.85).

Tenango Hills, Necaxa, 4600 ft. (B, I, a, 41); one shell. *S. ventrosus* has early whorls like *S. texoloensis* but the later whorls are much broader and higher and have closer striae. It has a smaller apex and less oblique suture than *S. fortis* (Marts.).

S. (P.) CADUCUS, new species.

Shell subcylindric-turrite, very light corneous, almost ivory, lightly translucent, with thin, well spaced riblets. Whorls 12, markedly convex with deep, simple suture. Apex fairly large; embryonic whorls 2¼, quite rapidly widening; almost smooth except gradual assumption of neanic sculpture on last half-whorl. Later whorls fairly short, gradually widening; first with about 55 threads which are closely spaced at beginning; second and third with 43 to 44 narrower riblets and widening interspaces; last with 43 thin but quite high riblets which abruptly taper down towards suture and gradually fade away on base. Aperture small, quadrate-ovate, long axis about 35° to that of shell; peristome almost vertical (about 10° to shell-axis) and slightly arcuate. Columella markedly concave and abruptly truncate; columellar and parietal callus distinct and continuous. Alt. 9.86, diam. 25 (2.48), alt. last whorl 32 (3.12); aperture: alt. 19 (1.88), diam. 65 (1.23).

Las Tortolas, Córdoba (AD, III, a, 4). *S. caducus* resembles *S. borealis* (Pils.), but has more deeply impressed suture and more convex whorls. It appears to be the commonest *Pseudosubulina* around Córdoba. A stouter form, with less concave columella, that occurs with it, measures: alt. 9.28, diam. 27 (2.50), alt. last whorl 36 (3.36); aperture: alt. 21 (1.97), diam. 61 (1.21); 10 ¾ whorls.

S. (P.) COSTATUS, new species.

Shell cylindric-turrite, imperforate, greenish white, translucent, costulate. Whorls about 8, flattened convex, with deep crenulate suture. Apex obtuse; embryonic whorls 2¼, rapidly widening, almost smooth (weakly punctate) but with fine striae appearing on last half-whorl. Later whorls gradually increasing, with heavy riblets, about as wide as interspaces, which are weakly and finely striate spirally; first with 30 ribs; last with only 20; last whorl convexly, gradually tapering with riblets weaker at basal end.

Aperture and peristome quite oblique (each about 30° to shell-axis), trapezoidal-ovate; palatal lip weakly arcuate, almost thickened; columella concave above, obliquely and rather weakly truncate. Alt. 3.81, diam. 29 (1.11), alt. last whorl 40 (1.51); aperture: alt. 23 (0.86), diam. 71 (0.61).

Atoyac (AD, I, a, 1), 1300 ft., infrequent. The convex whorls, oblique suture and quite oblique aperture of *S. costatus* distinguish it.

S. (P.) ARCUATUS, new species.

Shell subulate-turrite, imperforate, whitish, translucent, with irregular fine arcuate riblets. Apex narrowly rounded; embryonic whorls $2\frac{3}{4}$; first 1.5 smoothish and remainder assuming close growth-threads. Later whorls short, gradually increasing, with fine closely spaced growth-threads, which become progressively weaker and more irregular and usually die out below greatest curvature of last whorl; first with 59 threads; second with 58; third with 52; fourth with 57 and last with 61. Aperture trapezoid with greatest dimension 30° to shell-axis; parietal callus thin but extensive; peristome almost vertical, noticeably arcuate. Columella almost straight, weakly and obliquely truncate. Alt. 4.02, diam. 30 (1.19), alt. last whorl 37 (1.49); aperture: alt. 23 (0.91), diam. 66 (0.60); 9 whorls.

Sumidero, about 3400 ft. (D, I, a, 6); very rare. The most striking features of *S. arcuatus* are its feeble, arcuate growth-threads.

S. (P.) PARVUS, new species.

Shell turrite, imperforate, silvery white, translucent, finely costulate. Whorls about $7\frac{3}{4}$, slightly flattened convex, with deep crenulate suture. Apex obtuse; embryonic whorls $2\frac{1}{4}$, rapidly widening, almost smooth (weakly punctate) but becoming closely thread-ribbed on last $\frac{3}{4}$ whorls. Later whorls quite short, gradually increasing, with fine but prominent thread-riblets, much narrower than their interspaces and weaker basally; without distinct spiral striae; first and second with about 36 threads; last with 38. Aperture slightly oblique (about 20° to long axis of shell), broadly trapezoidal-ovate; peristome almost vertical but arcuate below periphery; columella slightly concave, obliquely and weakly truncate. Alt. 3.40, diam. 35 (1.18), alt. last whorl 42 (1.44); aperture: alt. 26 (0.88), diam. 66 (0.58).

Above Necaxa, alt. 5000 ft. (BC, III, a, 34); quite infrequent. *S. parvus* has similar growth sculpture to *S. linearis* (Pfr.), as figured by Strebel und Pfeffer, but the latter has much more oblique whorls and appears to have simpler columella.

OBITUARY OF PROFESSOR A. E. BOYCOTT, F.R.S.

With the death of Arthur Edwin Boycott on 12th May Science lost an outstanding man distinguished both as a pathologist and a naturalist, and the many who knew him lost a valued and greatly respected friend ever ready to help anyone, however undistinguished, who was genuinely seeking the advancement of knowledge.

Boycott was born at Hereford in 1877 where he received his early education at the Cathedral School. From this he entered Oriel College, Oxford, with an open classical scholarship in 1894. During the first part of his university career he continued his classical studies, gaining a first class in Classical Moderations. Then he turned to medicine and graduated with first class honours in Natural Science. He completed his medical course at St. Thomas's Hospital, London, and graduated M.B. (Oxon) in 1902. Research was his chosen line and in the next year he was appointed to a subsidiary lectureship at Guy's Hospital, London, and elected to a fellowship at Brasenose College, Oxford. In 1904 he went to the Lister Institute and three years later was recalled to Guy's. In 1912 he was appointed to the chair of pathology at Manchester, but in 1915 he returned to London to occupy the Graham chair of pathology at University College, where he remained till continued ill-health led him to resign in 1935. Of his contributions to pathology this is not the place to speak in detail, but their importance was recognized by his election to the Royal Society in 1914 at the age of 37.

The deep interest in land and freshwater snails which was to last his lifetime had early taken root. At the age of 15 Boycott published his first paper containing a list of the species to be found in Herefordshire. During the next 46 years there appeared from his pen a long series of notes and papers which revealed the exceptional qualities of his mind and invariably shed new light on the many problems he attacked. His scholarly outlook and nice sense of words gave his style a lucidity, literary charm and precision often sadly lacking in scientific communications. His interest was directed mainly to the properties of the living organism in its natural surroundings; and, though sometimes dogmatic and even difficult in the affairs of men, he faced nature with the wondering humility of the true naturalist.

It is difficult to assess the total contribution of a man whose interest was so wide and whose capacity for work was so unbounded, but it is possible to consider his influence on each of five fields of enquiry: general studies, biometry, genetics, ecology, and geographical distribution. Under the first head may be included a number of notes often on little understood or closely related species and dealing with variation, anatomy, sexual differences, habits, or pathology, but each contributing new facts, clearing up old difficulties, or correcting misapprehensions. In this field of minor problems striking advances are not to be expected, but it is the general effect on contemporary work and thought that is of importance; and these notes are but a partial crystallization of the wide and stimulating influence he exerted and the wise counsel he gave to all who came in contact with his work or sought his guidance. He was impressed with the value of the work of local natural history societies and other amateur bodies, and always ready to do anything to further their efforts. It was in this spirit that Boycott sought to spread knowledge of the use of statistical and biometrical methods, and in his presidential address to the Malacological Society of London gave with his usual lucidity a statement for the plain man on practical conchometry. Here, again, the study of snails gained much not only from Boycott's own enquiries but from those he encouraged other workers to undertake.

It is in the field of genetics that Boycott's name has become most widely known to general biologists. When, in a pond near Leeds, he came across a natural population of *Limnaea peregra* which contained a proportion of sinistrals far higher than chance abnormality would suggest, he at once recognized that here was an excellent problem to which genetical analysis might be applied. In 1920 he brought back four sinistrals for breeding. These original parents formed the basis of the enormous stock, amounting in some ten years to about 1,000,000 snails, from which the now classical conclusions were drawn. His results in the first two years showed that the inheritance of sinistrality was no simple problem and that large scale breeding was essential. He appealed for collaborators and, being the man he was, obtained an immediate response. During the next eight years he controlled and

himself bore most of the labor—the annual counting of thousands of trays full of minute young *Limnaea*—of this vast experiment. This work was undertaken in addition to what most men would have regarded as a full life, his professorial duties and his editorship of the Journal of Pathology, not to mention his general molluscan interests and other experiments such as that on *Hydrobia jenkinsi*. It is hardly surprising that he had little time for rest, and the strain of these years undoubtedly told on his health; but he was as incapable of sparing himself as he was of departing from the high principles that governed his scientific outlook and dictated his behavior. When his work on sinistrality was closing down, he began experiments on the shell shape that characterizes different natural populations of *L. peregra*. He had a number of different strains in culture, some of which were carried to the sixth generation. This work was continued after his retirement and throughout his last illness. The paper embodying its results, now in the press, was only completed a few days before his death.

From his earliest studies in Herefordshire (1896–7) to his detailed survey of the parish of Aldenham in Herefordshire on which the last paper was published in 1929, Boycott had been steadily amassing a wealth of information about where snails live. This knowledge he summarized in two masterly papers (one of which was based on his presidential address to the British Ecological Society) which firmly laid the foundations of molluscan ecology. For these publications ecologists concerned with land and freshwater snails owe Boycott a debt which they can only repay by carrying on the work he loved and trying to maintain the exceptionally high standards he set. In this field, as in genetics, his contributions to knowledge stand in print to form a fitting monument to his endeavor; but his equally important work on distribution carried out as recorder to the Conchological Society of Great Britain and Ireland—a duty undertaken on Roebuck's death in 1919 and continued till his own death—is known only to a smaller circle. Working on the material that Roebuck had collected, he produced in 1921 an edition of the Society's census of land and freshwater mollusca which is a model for all future work of its kind for whatever group of organisms. It is a great loss that he did not live to complete a revised edition based on his own years of work as recorder.

As a man, Boycott's strong personality, hatred of shams, and uncompromising adherence to his principles, sometimes made him appear stern to those who did not understand him; but to his friends he firmly endeared himself by his deep sincerity, integrity and great personal charm. Whether as a collaborator in the laboratory or as a companion in the field, where perhaps he was in his happiest vein, his lively interest, delicate humor, and unconventional behavior, made even the most tiresome drudgery a pleasant occupation. Out of such men comes not only the advance of knowledge but a hope for the future of humanity.

CAPT. CYRIL DIVER

NOTES AND NEWS

PHYSA ON THE CALIFORNIA ISLANDS.—In the Smithsonian Report for 1877, p. 317, Dr. Stephen Bowers has an account of the Pleistocene of Santa Rosa Island, based on the work of Dr. L. A. Yates. He says: "near the mouth of Soledad Canyon there is a fine exposure of strata consisting of about 90 feet of post-Pliocene deposits, containing fossil bones of vertebrates and at one place fossil *Physa,* at a depth of some 75 feet below the surface." In 1890, Yates recorded *Physa d'orbignyana* Lea from Santa Rosa Island. *P. d'orbignyana,* described from Monterey, California, is a synonym of *P. virgata* Gould, according to Pilsbry and Ferriss. In 1938, I found *Physa* on San Nicolas and Santa Catalina Islands, and all the specimens have been found by Mr. W. J. Clench to be *P. virgata* Gould; he has kindly compared them with Gould's types, and the determination is unquestioned. The specimens on San Nicolas were found in a spring close to the sea, along with a new species of Isopod (*Exosphaeroma*), which is being described by W. G. Van Name. Those from Santa Catalina were obtained from an artificial water-lily pond in the garden of Carl W. Carson, in the middle of Avalon. On the water-lily leaves were many *Helix aspersa,* and the slugs *Limax arborum* (*marginatus* auctt.) and *L. flavus,* these three being of course European species introduced. I visited Echo Lake, said to be the only natural lake on Sta. Catalina, but found no mollusca, only tadpoles and *Notonecta.*—T. D. A. COCKERELL.

CORRECTION OF CERTAIN FIGURE REFERENCES TO CHOANOPOMA.—In the NAUTILUS, vol. 47, no. 4, April, 1934, p. 133, *Choanopoma* (*Annularodes*) *uncinatum indivisum* Welch should have reference to Pl. 11, figs. 8 and 9; Fig. 9 being the holotype. On p. 135, *Choanopoma* (*Annularodes*) *pilsbryi* Welch should have Pl. 11, figs. 10 and 11; Fig. 11, the holotype, measures Leng. 17.1 mm., gr. diam. 9.7 mm.—D'ALTÉ WELCH.

PSEUDANTALIS MONTEROSATO, Nom. Gen. e Spec. Conch. Medit., p. 32 (1884), was proposed for several species but without designation of type. *P. rubescens* (*Dentalium rubescens* Desh.) is to be taken as genotype.—PILSBRY.

THE EMMET RIXFORD COLLECTION.—Collecting Mollusca was a side issue of this eminent surgeon, pursued at various times through a busy career. His own efforts, as those of his son, Dr. Emmet Rixford, Jr., were confined largely to California, and were directed primarily toward the land forms. The men became expert in finding rare or unusual species. In addition to such material, the collection contains the shells obtained many years ago by William Sutton, who was connected with a lumber firm in San Francisco. Mr. Sutton was in correspondence with many conchologists in the 1880's and 90's and some very unexpected names appear on the labels. There is also present a considerable amount of material from Mr. Willard M. Wood and some from A. W. Crawford, the eccentric cabinet-maker who discovered *Monadenia circumcarinata* and other rarities. The collection has been presented to the California Academy of Sciences where it is now being sorted and catalogued.—G. D. HANNA.

DR. GEORGE H. CLAPP'S eightieth birthday was celebrated on December 16th by a dinner given by the board of trustees of the University of Pittsburgh, of which Dr. Clapp is President.

MR. E. G. VANATTA, for nearly forty years on the staff of the Department of Mollusks of the Academy of Natural Sciences, died on January 19th, after a long illness. Further notice will follow.

NOTE RE *Paphia bifurcata*, A NEW MOLLUSCAN SPECIES FROM LADYSMITH HARBOUR, B. C.—The description of this species, then considered as new to science, was published in the Journal of the

Fisheries Research Board of Canada, 4 (1), 1938. Since that time it has been found that the mollusk is *Paphia philippinarum* Adams and Reeve, a species indigenous to Japan. Apparently it was introduced into Ladysmith Harbour with Japanese seed oysters (*Ostrea gigas*) imported into Ladysmith Harbour just previous to 1930. This accounts for the limited distribution. It is regretted that such an error has been made, but at least the addition of the species to the molluscan fauna of British Columbia is recorded and a description of it is now available.—D. B. QUAYLE.

NEW OPERCULA FOR OLD.—In a letter written several years ago, Herbert H. Smith spoke of finding species of Pleuroceridae in which a lost or diseased operculum had been replaced with a fresh one. He gave no description of the regenerations. I have come upon one complete operculum and part of another which may be cases of this phenomenon. They were taken from specimens of *Pleurocera canaliculatum undulatum* (Say) which were collected by Mr. W. J. Clench in a stream of north Alabama. The intact operculum is very thin, and a little more than twice the size of opercula of accompanying specimens. Both margins are frayed, and the left margin shows none of the thickening or parallel extensions which is usual in the genus. The base is not flattened in the ordinary way, and the nuclear whorls are open, well marked; not pinched or eroded. The area of attachment can scarcely be defined since it lacks the raised callus at the borders which represent accretions. There are innumerable growth lines, but not one of those dark scars which we have come to think of as recording rest periods. The whole operculum looks as though it had been secreted hurriedly. It cannot be said with positiveness that this is an example of regeneration, but only that it carries that suggestion.—CALVIN GOODRICH.

SINISTRAL LIGUUS FASCIATUS ROSEATUS.—While returning from the Havana meet of last year with two companions we stopped on Key Largo to collect a few more of the *Liguus* or tree snails. What was my astonishment and delight on getting into the car with five specimens in my hand to notice that one was sinistral. It was fully developed and belongs to the *roseatus* group. I understand that one can count on the fingers of one hand the number of sinistral *Liguus* known.—D. L. EMERY.

CYPRAEA SPADICEA IN THE BULLA STAGE.—In looking over some of my back numbers of the "Nautilus" I noticed in the copy of July, 1938, a statement of Mr. Ingram regarding the bulla stage of the *Cypraea spadicea* Swains. that he believes his collected in 1937 were among the first to be taken alive.

While living in San Diego, in December, 1915, Mrs. Stephens, of the S. D. Society of Natural History, and I collected 30 of these *Cypraea* all alive and as near as I can remember now about 50% of them were in the bulla stage. I now have in my collection a series of 6 of these juveniles measuring from 13 to 34 mm. Not a dead specimen was found at that time.

I have a fine pair found at Point Loma about a year later which are fully developed and measure 32 mm. These have fine color, also a fine bluish-gray specimen which looks as though it had just finished developing the teeth, measuring 42 mm. This last has just started putting on a little color. I think this rather antedates Mr. Ingram's specimens.—D. L. EMERY, St. Petersburg, Fla.

THE CONCHOLOGICAL CLUB OF SOUTHERN CALIFORNIA has issued their Program for 1939, giving subjects and speakers for the twelve regular meetings, together with a list of 74 members and 17 associate members. The Club was organized in 1902. This interesting program and the membership list are good evidence that conchology is flourishing in California.

POMACEA PALUDOSA A PREDATOR ON THE BROWN DARTER.—On February 26, 1939, I observed a gravid female brown darter (*Villora edwini*) perched on the shell of a specimen of *Pomacea paludosa* which was clinging to the wall of a five gallon aquarium about one inch below the surface of the water. The presence of both creatures there may have been due to the fact that a lamp, left burning a few inches over the water at that end of the aquarium, had slightly warmed the water. When I left the room for a brief period, the snail was stationary, and there was a space about the width of the fish's body between the shell of the snail and the wall to which it was fixed.

When I returned to the scene about ten minutes later the snail had dropped to the bottom, and its foot was wrapped about the body of the darter. Examination showed that the entire belly-

wall, all the viscera, and part of the dorsal muscles of the fish had been eaten away.

The snail had an operculum diameter of approximately 2.2×1.5 centimeters; the fish was 4 cm. in length and apparently in good health. The aquarium in which the incident occurred contained three strands of *Cabomba caroliniana* and a large rock; the bottom was covered by an inch of Interlachen sand. Beside the snail and the fish mentioned above, the only macroscopic organism present was a swamp darter, (*Hololepis barratti*). The aquarium received little light, and algal growth was very sparse—William A. McLane, Department of Biology, University of Florida.

Succession of Teeth in Fresh-water Mollusca.—If one compares the nascent posterior rows of teeth in radulae with the blunted anterior extremity there can be no question of constant wear and tear whilst feeding, as I had mistakenly doubted through studying the embryonic and adult radulae of fresh-water mollusca. There must be more replacement of teeth among those species which feed on coarse vegetation than occurs among those whose food consists largely of micro-fungi but I have noted blunting in from thirty to forty rows in examples of *Physopsis africana* Krauss and *Bulinus tropicus* Krauss. Unlike the elongated radulae of terrestrial species, those of fresh-water species may be only twice as long as they are broad. This does not suggest so much shedding of teeth as occurs in terrestrial species. Teeth in the middle rows are most numerous, because the extremities of the anterior rows are exposed to wear and are constantly being thrown off. The number of teeth in the middle rows of individual radulae at the Natal Museum are approximately as follows:

Physopsis africana Krauss	70;	number	of	transverse	rows 158
Bulinus tropicus (Krauss)	48;	"	"	"	" 119
Lymnaea natalensis Krauss	76;	"	"	"	" 90
Planorbis pfeifferi Krauss	44;	"	"	"	" 120
Melampus pineatus Jaq.	82;	"	"	"	" 196
Succinea oblonga Drap.	60;	"	"	"	" 103

F. Gordon Cawston

The American Malacological Union will hold its ninth annual meeting in the Royal Ontario Museum of Zoology, Queen's Park

at Bloor St., Toronto, Ontario, from Tuesday, June 20th to Friday, June 23rd, inclusive. A part of the program will be devoted to fossil mollusks. Titles of papers and time required for delivery should be sent to John Oughton at the above mentioned address, or to the Secretary, Mrs. Harold R. Robertson, Buffalo Museum of Science, Buffalo, N. Y.

SETIPELLIS STIGMATICA (PFEIFFER).—The anatomy of specimens (ANSP. 163914) from Puerta de Ancón, Viñales, Pinar del Rio, Cuba, shows that *Setipellis* Pilsbry (1926, Proc. ANSP. 78: 111), proposed as a section of *Suavitas* Pilsbry (1926: 109; Sagdidae) on account of distinct resemblances in shell characters, actually belongs in the Cepolinae (Helicidae). As contrasted with *Cepolis,* its epiphallus is very short with the flagellum only represented by a slight conical protuberance. Its dart-glands (?) consist of a large bundle of long parallel tubules and (in one of two animals) a vestigial pair of short ones; both open, at the level of the atrium, into a cavity formed by a sheath that surrounds the atrium and the dart-sac.—H. BURRINGTON BAKER.

EXSUAVITAS, NEW SUBGENUS OF AQUEBANA PILSBRY.—The genitalia of animals of *Aquebana* (*Exsuavitas*) *pubescens* (Pfeiffer), collected June 12, 1933, halfway between Kenskoff (alt. 4785 ft.) and Petionville, Haiti, exhibit a very short appendicular branch of the penis and a small but well formed, tubular appendix. The epiphallar branch is invested by a gland which consists of short tubules or alveoli and the epiphallus itself lacks a flagellum. Although *A. pubescens* evidently belongs in the Sagdinae, it does not appear to be congeneric with *Suavitas* Pilsbry, of which *Aquebana* Pilsbry (1926, p. 111) was proposed as a subgenus, or with any of the Jamaican genera (See H.B.B., 1935, Naut. 48: 135). The anatomy of *A. velutina* (Lamarck), the type of the genus from Puerto Rico, is unknown, but the postembryonic whorls of its shell have scabious epidermal expansions along the growth-wrinkles, quite different from those of *A. pubescens,* the type of the new subgenus EXSUAVITAS, which bear short hairs arranged in protractive and retractive rows.—H. BURRINGTON BAKER.

CEPOLIS (EUCLASTARIA?) DEBILIS (PFEIFFER).—The genitalia of animals from Matanzas, Cuba (C. G. Aguayo, April, 1931), are quite similar to those of *C.* (*Plagioptycha*) *salvatoris* (Pfr.), as figured by Dr. Pilsbry (1895, Manual, vol. 9, pl. 52, f. 15). The systematic position of *Euclastaria* Pilsbry (1926, p. 112), proposed as a subgenus of *Suavitas,* depends on the unknown anatomy of its type species, *C.? musicola* (Shuttleworth) from Puerto Rico.—H. BURRINGTON BAKER.

STAGNICOLA BULIMOIDES VANCOUVERENSIS NOV. VAR.—Shell differing from typical *bulimoides* in its larger size, more ovate and widely expanded aperture, wider inner lip which is less triangular than in typical *bulimoides,* and coarser sculpture which is almost rib-striate in some specimens.

L. 18.5;	D. 10.2;	Aperture L. 11.4;	D. 6.5 mm.	Paratype
18.2	10.6	11.4	6.1 mm.	"
18.0	10.4	9.8	5.5 mm.	"

Type locality: Hospital, Nanaimo, Vancouver Island, B. C. Holotype and paratypes in Leland Stanford University. Paratypes in Baker Coll., No. 3197. This large form of *S. bulimoides* is apparently common in the southern part of Vancouver Island. It was discovered by the late Professor Junius Henderson when making a study of the Hemphill material in the Leland Stanford University Museum. A figure will appear later.—FRANK C. BAKER.

PUBLICATIONS RECEIVED

THE SNAIL POLYGYRA THYROIDUS AS A MYCOPHAGIST. By Fred T. Wolf and Frederick A. Wolf. Bull. Torrey Bot. Club 66: 1–5, 1 fig., 1939. The snail was observed under natural conditions to eat the powdery mildew *Microsphaera alni* on lilac, several feet above ground, in consequence of which a feeding track of peculiar and characteristic design was produced on the leaves. Similar tracks were found on crustose lichens and on the sporophores of *Polyporus picipes.* It preferred fungi to lettuce and other green plants.—H. B. B.

Vol. 52 JULY, 1938 No. 1

THE NAUTILUS

A QUARTERLY
DEVOTED TO THE INTERESTS OF CONCHOLOGISTS

EDITORS AND PUBLISHERS:
HENRY A. PILSBRY, Curator of the Department of Mollusca, Academy of Natural Sciences, Philadelphia
H. BURRINGTON BAKER, Associate Professor of Zoology, University of Pennsylvania

CONTENTS

$2.00 per year ($2.15 to Foreign Countries) 50 cents a copy

HORACE B. BAKER, *Business Manager*
Zoological Laboratory, University of Pennsylvania,
38th and Woodland Avenue, Philadelphia, Pa.

Entered as Second-Class matter, October 29, 1932. at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879.

THE NAUTILUS:

A Quarterly Journal devoted to the study of Mollusks, edited and published by HENRY A. PILSBRY and H. BURRINGTON BAKER.

Matter for publication should reach the senior editor by the first of the month preceding the month of issue (January, April, July and October). *Typescript should be double spaced.*

REPRINTS are furnished at printer's rates. Orders should be written on or attached to first page of manuscript.

	4 pp.	*8 pp.*	*16 pp.*
50 copies	$3.70	5.40	7.60
100 copies	4.10	6.00	8.50
Additional 100s	.75	1.20	1.80

Covers: 50 for $2.50; additional covers at the rate of $1.50 per hundred.

Plates (pasted in): 65 cents for 50; $1.20 for 100.

THE NAUTILUS is the official organ of the American Malacological Union. Information regarding membership in the Union may be obtained from Mrs. Imogene C. Robertson, Financial Secretary, Buffalo Museum of Science, Buffalo, N. Y.

EXCHANGE NOTICES

FOR EXCHANGE: Fifteen varieties, Florida tree snails (*Liguus*) including three of the rare *solidus*, to exchange for Achatinella, Amphidromus, Bulimulus, Cochlostyla, Orthalicus, Porphyrobaphe and Placostylus. Send your list to

PAUL P. MCGINTY, Boynton, Florida.

WANTED: Back Volumes and Numbers of THE NAUTILUS. Especially Vols. 3, 4, 18, 20, 21, 22, 23 and 24. Address

HORACE B. BAKER, Zool. Lab., Univ. Pennsylvania.

WANTED: Pupillidae preserved in alcohol for dissection.

PROF. C. M. STEENBERG, University of Copenhagen, Nörregade 10, Denmark

FOR EXCHANGE: Key West and lower Florida Keys marine and land shells.

MRS. MARIO V. CALLEJA, 1117 Fleming Street, Key West, Fla.

EXCHANGE NOTICE: I exchange European land and freshwater shells and from the territory of Poland for oversea specimens. I exchange always very good samples and I can supply the collection of the Polish forms of land and freshwater mollusks.

ADOLF SITSCH, Radomyil nad Sanem, Lubelska 35, Poland.

(*Continued on p. iii*)

Vol. 51 OCTOBER, 1938 No. 2

THE NAUTILUS

A QUARTERLY
DEVOTED TO THE INTERESTS OF CONCHOLOGISTS

EDITORS AND PUBLISHERS:
HENRY A. PILSBRY, Curator of the Department of Mollusca, Academy of Natural Sciences, Philadelphia
H. BURRINGTON BAKER, Associate Professor of Zoology, University of Pennsylvania

CONTENTS

$2.00 per year ($2.15 to Foreign Countries) 50 cents a copy

HORACE B. BAKER, *Business Manager*
Zoological Laboratory, University of Pennsylvania,
38th and Woodland Avenue, Philadelphia, Pa.

Entered as Second-Class matter, October 29, 1932. at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879.

THE NAUTILUS:

A Quarterly Journal devoted to the study of Mollusks, edited and published by HENRY A. PILSBRY and H. BURRINGTON BAKER.

Matter for publication should reach the senior editor by the first of the month preceding the month of issue (January, April, July and October). *Typescript should be double spaced.*

REPRINTS are furnished at printer's rates. Orders should be written on or attached to first page of manuscript.

	4 pp.	*8 pp.*	*16 pp.*
50 copies	$3.70	5.40	7.60
100 copies	4.10	6.00	8.50
Additional 100s	.75	1.20	1.80

Covers: 50 for $2.50; additional covers at the rate of $1.50 per hundred.

Plates (pasted in): 65 cents for 50; $1.20 for 100.

THE NAUTILUS is the official organ of the American Malacological Union. Information regarding membership in the Union may be obtained from Mrs. Imogene C. Robertson, Financial Secretary, Buffalo Museum of Science, Buffalo, N. Y.

EXCHANGE NOTICES

FOR EXCHANGE: Fifteen varieties, Florida tree snails (*Liguus*) including three of the rare *solidus*, to exchange for Achatinella, Amphidromus, Bulimulus, Cochlostyla, Orthalicus, Porphyrobaphe and Placostylus. Send your list to

PAUL P. MCGINTY, Boynton, Florida.

WANTED: Back Volumes and Numbers of THE NAUTILUS. Especially Vols. 3, 4, 18, 20, 21, 22, 23 and 24. Address

HORACE B. BAKER, Zool. Lab., Univ. Pennsylvania.

WANTED: Pupillidae preserved in alcohol for dissection.

PROF. C. M. STEENBERG, University of Copenhagen, Nörregade 10, Denmark

FOR EXCHANGE: Key West and lower Florida Keys marine and land shells.

MRS. MARIO V. CALLEJA, 1117 Fleming Street, Key West, Fla.

EXCHANGE NOTICE: I exchange European land and freshwater shells and from the territory of Poland for oversea specimens. I exchange always very good samples and I can supply the collection of the Polish forms of land and freshwater mollusks.

ADOLF SITSCH, Radomyil nad Sanem, Lubelska 35, Poland.

(*Continued on p. iii*)

Vol. 52 JANUARY, 1939 No. 3

THE NAUTILUS

A QUARTERLY
DEVOTED TO THE INTERESTS OF CONCHOLOGISTS

EDITORS AND PUBLISHERS:
HENRY A. PILSBRY, Curator of the Department of Mollusca, Academy of Natural Sciences, Philadelphia
H. BURRINGTON BAKER, Associate Professor of Zoology, University of Pennsylvania

CONTENTS

$2.00 per year ($2.15 to Foreign Countries) 50 cents a copy

HORACE B. BAKER, *Business Manager*
Zoological Laboratory, University of Pennsylvania,
38th and Woodland Avenue, Philadelphia, Pa.

Entered as Second-Class matter, October 29, 1932, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879.

THE NAUTILUS:

A Quarterly Journal devoted to the study of Mollusks, edited and published by HENRY A. PILSBRY and H. BURRINGTON BAKER.

Matter for publication should reach the senior editor by the first of the month preceding the month of issue (January, April, July and October). *Typescript should be double spaced.*

REPRINTS are furnished at printer's rates. Orders should be written on or attached to first page of manuscript.

	4 pp.	*8 pp.*	*16 pp.*
50 copies	$3.70	5.40	7.60
100 copies	4.10	6.00	8.50
Additional 100s	.75	1.20	1.80

Covers: 50 for $2.50; additional covers at the rate of $1.50 per hundred.

Plates (pasted in): 65 cents for 50; $1.20 for 100.

THE NAUTILUS is the official organ of the American Malacological Union. Information regarding membership in the Union may be obtained from Mrs. Imogene C. Robertson, Financial Secretary, Buffalo Museum of Science, Buffalo, N. Y.

EXCHANGE NOTICES

WANTED: One dollar each will be paid for July, 1938, copies of THE NAUTILUS.

HORACE B. BAKER, Zool. Lab. Univ. Penna.

FOR EXCHANGE: Fifteen varieties, Florida tree snails (*Liguus*) including three of the rare *solidus*, to exchange for Achatinella, Amphidromus, Bulimulus, Cochlostyla, Orthalicus, Porphyrobaphe and Placostylus. Send your list to

PAUL P. MCGINTY, Boynton, Florida.

WANTED: Back Volumes and Numbers of THE NAUTILUS. Especially Vols. 3, 4, 18, 20, 21, 22, 23 and 24. Address

HORACE B. BAKER, Zool. Lab., Univ. Pennsylvania.

WANTED: Pupillidae preserved in alcohol for dissection.

PROF. C. M. STEENBERG, University of Copenhagen, Nörregade 10, Denmark

FOR EXCHANGE: Key West and lower Florida Keys marine and land shells.

MRS. MARIO V. CALLEJA, 1117 Fleming Street, Key West, Fla.

EXCHANGE NOTICE: I exchange European land and freshwater shells and from the territory of Poland for oversea specimens. I exchange always

(*Continued on p. iii*)

very good samples and I can supply the collection of the Polish forms of land and freshwater mollusks.

ADOLF SITSCH, Radomyil nad Sanem, Lubelska 35, Poland.

FOR EXCHANGE: European and Foreign shells (large number of recent and tertiary sp.) offered against sp. new to me. Apply with full list to:
J. L. STAED, 123 Rue Clovis, Rheims, Marne, France.

West Coast Shells for sale or exchange. My list sent on request.
TOM BURCH, 1611 South Elena Avenue,
Redondo Beach, California

HANDBOOK FOR SHELL COLLECTORS

2,200 illustrations and descriptions, prices they are usually sold for and much other valuable matter. How to properly clean shells, approximate number of species under the genera treated. Price $2.50 prepaid. Also a special U.S.A. book covering marine shells on both coasts, some land shells, invertebrates, etc., paper bound only $1.00.

I have 25,000 species of shells in stock properly classified and sold for the most reasonable prices. Boxes on approval and selection as often as you wish. Shells have been my hobby since 1893 and I expect I have followed it farther and spent more real cash on them than any one now living in this country. Let me hear from you if you mean business.

Walter F. Webb
202 Westminster Road Rochester, N. Y.

TO ALL MUSEUMS AND COLLECTORS:

If you will send to me a Johnson check list with the specimens you especially desire checked off, or indicated, I will place your name on my "serve in proper turn list." This will fix matters so that you may secure some of the more rare species being turned up from time to time by The Frank Lyman Family. Your check list will be promptly returned. Fifty per cent discount is allowed to all Public Museums. No exchanges are made. All specimens sent on approval. If your wants are few a letter stating species desired will serve as well as a check list. Write today.

FRANK B. LYMAN,
Lantana, Florida

EAST COAST MARINE SHELLS

Descriptions of shore mollusks occurring from Maine to Texas together with figures of practically every species including many from off shore stations. More than a thousand illustrations, including photographs and drawings.

Edition limited to one thousand copies. Cloth bound $4.50. Orders filled in order of receipt. Address the author:

MAXWELL SMITH,
Lantana, Florida

Vol. 52 APRIL, 1939 No. 4

THE NAUTILUS

A QUARTERLY
DEVOTED TO THE INTERESTS OF CONCHOLOGISTS

EDITORS AND PUBLISHERS
HENRY A. PILSBRY, Curator of the Department of Mollusca, Academy of Natural Sciences, Philadelphia
H. BURRINGTON BAKER, Associate Professor of Zoology, University of Pennsylvania

CONTENTS

$2.00 per year ($2.15 to Foreign Countries) 50 cents a copy

HORACE B. BAKER, *Business Manager*
Zoological Laboratory, University of Pennsylvania,
38th and Woodland Avenue, Philadelphia, Pa.

Entered as Second-Class matter, October 29, 1932, at the Post Office at Philadelphia, Pa., under the Act of March 3, 1879.

THE NAUTILUS:

A Quarterly Journal devoted to the study of Mollusks, edited and published by HENRY A. PILSBRY and H. BURRINGTON BAKER.

Matter for publication should reach the senior editor by the first of the month preceding the month of issue (January, April, July and October). *Typescript should be double spaced.*

REPRINTS are furnished at printer's rates. Orders should be written on or attached to first page of manuscript.

	4 pp.	*8 pp.*	*16 pp.*
50 copies	$3.70	5.40	7.60
100 copies	4.10	6.00	8.50
Additional 100s	.75	1.20	1.80

Covers: 50 for $2.50; additional covers at the rate of $1.50 per hundred.

Plates (pasted in): 65 cents for 50; $1.20 for 100.

THE NAUTILUS is the official organ of the American Malacological Union. Information regarding membership in the Union may be obtained from Mrs. Imogene C. Robertson, Financial Secretary, Buffalo Museum of Science, Buffalo, N. Y.

EXCHANGE NOTICES

WANTED: One dollar each will be paid for July, 1938, copies of THE NAUTILUS.

HORACE B. BAKER, Zool. Lab. Univ. Penna.

FOR EXCHANGE: Fifteen varieties, Florida tree snails (*Liguus*) including three of the rare *solidus*, to exchange for Achatinella, Amphidromus, Bulimulus, Cochlostyla, Orthalicus, Porphyrobaphe and Placostylus. Send your list to

PAUL P. MCGINTY, Boynton, Florida.

WANTED: Back Volumes and Numbers of THE NAUTILUS. Especially Vols. 3, 4, 18, 20, 21, 22, 23 and 24. Address

HORACE B. BAKER, Zool. Lab., Univ. Pennsylvania.

WANTED: Pupillidae preserved in alcohol for dissection.

PROF. C. M. STEENBERG, University of Copenhagen, Nörregade 10, Denmark

FOR EXCHANGE: Key West and lower Florida Keys marine and land shells.

MRS. MARIO V. CALLEJA, 1117 Fleming Street, Key West, Fla.

EXCHANGE NOTICE: I exchange European land and freshwater shells and from the territory of Poland for oversea specimens. I exchange always

(*Continued on p. iii*)

very good samples and I can supply the collection of the Polish forms of land and freshwater mollusks.

ADOLF SITSCH, Radomyil nad Sanem, Lubelska 35, Poland.

FOR EXCHANGE: European and Foreign shells (large number of recent and tertiary sp.) offered against sp. new to me. Apply with full list to:
J. L. STAED, 123 Rue Clovis, Rheims, Marne, France.

West Coast Shells for sale or exchange. My list sent on request.
TOM BURCH, 1611 South Elena Avenue,
Redondo Beach, California